Jemena Gas Networks (NSW) Ltd – Further response to the draft decision

Attachment 2

Plastics cost escalators

28 April 2010

Contents

1 OVERVIEW AND KEY MESSAGES

- Polyethylene and polyamides (generically both called 'plastics') are raw materials widely used in making distribution pipes for Australian gas distribution networks They form important components of capital and operating expenditure programs put forward by regulated gas businesses.

- Jemena Gas Networks (NSW) Ltd (JGN) uses both these forms of plastic pipes and joinery in its network.

- For its original AA revision proposal[1], JGN used polyethylene as a proxy for all forms of plastic for a derived cost escalator. JGN assessed—based on the advice from its consultants Competition Economists Group (**CEG**)—that the costs of developing more complex models for each plastic component is neither necessary nor prudent for arriving at a realistic cost escalator. The CEG modelling determined that positive real escalators should apply.

- For a variety of reasons the Australian Energy Regulatory (AER) in its draft decision[2] for JGN and other final gas networks decisions[3] so far has rejected the futures modelling approach adopted by CEG which was submitted by all the gas businesses: JGN, ActewAGL and Country Energy.

- The AER has determined that any plastics real cost escalator across the entire access arrangement which is greater than zero would be non-compliant with the NGR.

- This submission demonstrates that:

  – All plastic pipes (including polyethylene and nylon derivatives) are current alternatives for the JGN network, and should be considered as a single class of product for the purpose of assessing an appropriate plastic price escalator.

  – In addition to using predominantly polyethylene piping, JGN has historically used a range of nylon pipe on its network, some of which is petroleum based, and some of which is not. The AER's assumption in its draft and final decisions that the nylon pipe used by JGN cannot be attributed to petroleum-based sources of raw material (and thus cannot be correlated with petroleum in some way) is incorrect.

[1] Jemena Gas Networks (NSW) Ltd, *Access Arrangement Information*, 25 August 2009, pp 82-83.

[2] AER Draft decision, *Jemena – Access arrangement proposal for the NSW gas networks, 1July 2010 – 30 June 2015*, pp 63-64.

[3] AER Final decision, *Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network*, *1 July 2010–30 June 2015*, March 2010, pp. 25-26.

AER Final decision, *Access arrangement proposal - Wagga Wagga natural gas distribution network, 1 July 2010–30 June 2015*, March 2010, p. 18.

- In any event, the statistical evidence demonstrates that the prices of imported plastic raw materials, including those used for making plastic pipe, have exceeded Australian inflation over the long term.

- Most significantly, documentary evidence from suppliers of plastic pipe to the JGN network, either directly or through contractors, shows that plastic pipe prices have well exceeded inflation due to sporadic price increases by suppliers. Where pipe is supplied under contract to JGN, escalation clauses allow for raw material price increases to be passed on. In some cases, prices can be increased if annual contract volumes fall below certain levels.

- JGN therefore submits that:

  - it is artificial to distinguish between the different types of plastic pipe used on the JGN network for the purpose of deriving an appropriate cost escalator, including polyethylene and the many varieties of nylon

  - the majority of plastic pipe used on the JGN network is petroleum based, contrary to the implicit view of the AER draft decision

  - the real price escalation of the vast majority plastics used on the JGN network has demonstrably been greater than zero and is likely to be so in the future

  - given the interchangeability between the different types of plastic usage on a network, JGN submits that a forecast zero real price escalator is unsustainable and would not allow JGN to recover at least its efficient costs.

2 PLASTIC RAW MATERIALS

Both polyethylene and polyamides (including nylon-11) are raw materials widely used in making distribution pipes for Australian gas distribution networks. They are important components of capital and operating expenditure programs put forward by regulated gas businesses as part of access arrangement reviews. JGN uses both these forms of plastic pipes and joinery in its network.

JGN's proposed AA revision proposal (August 2009) adopted polyethylene as a proxy for all forms of plastic. This was a pragmatic forecasting decision because:

- the polyethylene proxy was derived from observable crude oil futures and was therefore consistent with recent AER decisions that relied upon escalator forecasts derived from observable futures data
- polyethylene and nylon were substitute goods which could generally be expected to demonstrate covariance in prices over time
- JGN's additional cost to produce detailed modelling which separately forecast the many forms of plastic was not justifiable
- the historical real price escalation of plastics was demonstrably greater than zero.

JGN considered that the AA adoption of polyethylene as a basis for forecasting plastics prices was fully consistent with NGR 74, in that the resulting forecast

- was arrived at on a reasonable basis; and
- represented the best forecast or estimate possible in the circumstances.

The NGL requires that a service provider should be provided with a reasonable opportunity to recover at least efficient costs (NGL s. 24(2)). JGN will be obliged to meet increases in the costs that it pays for plastic pipe material, both nylon and polyethylene, and this requires that justified cost escalation in all plastic pipe materials should be recoverable through its access arrangement proposal.

3 AER DECISIONS

3.1 Background

Three gas distribution businesses have been the subject of recent AER decisions involving the proposed use of a specific cost escalator for polyethylene, either as a stand-alone escalator, or as a proxy for nylon pipe, or both. They are:

- ActewAGL Distribution – draft and final AER decisions (November 2009 and March 2010)
- Country Energy Gas Pty Ltd – draft and final AER decisions (November 2009 and March 2010)
- Jemena Gas Networks (NSW) Ltd – draft AER decision (February 2010)

The relevant sections of each AER decision are included in appendix 3.

As part of their initial proposals to the AER, both ActewAGL and JGN submitted reports from the Competition Economists Group (CEG) which included a derived cost escalator for polyethylene, together with a rationale for using the polyethylene escalator as a proxy for nylon. Country Energy submitted a similar CEG report, but this addressed the price of polyethylene itself rather than as a proxy for nylon.

The AER draft decisions for all three businesses expressed concerns with the polyethylene escalator as calculated by CEG. The ActewAGL and JGN draft decisions also did not accept the notion that a link could be drawn between the price of polyethylene and the price of nylon (ie that they were substitutes).

In response to their respective AER draft decisions, ActewAGL and JGN submitted revised and updated CEG reports which attempted to address the AER's concerns on both issues.

The AER final decision for ActewAGL has again expressed concern with the proposed polyethylene escalator as a proxy for nylon.

3.2 Outcome of AER decisions

The outcome of all the AER's gas distribution draft and final decisions so far has been to require that regulatory proposals be amended to reflect a polyethylene price in line with general price movements (i.e. a zero real cost escalator) across the access arrangement period.

In JGN's view, none of the AER decisions on polyethylene has demonstrated how a zero real escalator for plastic piping and joinery can be:

- the best estimate possible in the circumstances

- a variation to the submitted regulatory proposals necessary only to achieve compliance with the NGR.

The implication of the AER's decisions is that any real escalator for plastic piping which is greater than zero would be non-compliant with the NGR. JGN considers this to be a conclusion without foundation given that the AER has not demonstrated that a zero real escalator is consistent with the NGR and that a zero real escalator is consistent with recent historical data.

Given the significant historic real price increases for plastic piping set out in section 5 of this submission, JGN considers that the AER's use of zero real escalation cannot be considered consistent with the NGL s.24(2) requirement that JGN be permitted to recover at least its efficient cost of service.

3.3 Rationale for AER decisions

The AER has generally noted a major concern with the CEG methodology in that insufficient evidence is presented of the relationship between nylon-11 and polyethylene prices.

The CEG report submitted by both ActewAGL and JGN in response to their respective AER draft decisions commented on the AER rationale for zero real escalation as follows[4]:

> We do not believe that the AER's concerns in regard to the price relationship between crude oil and nylon-11 justify setting aside the escalation factors estimated in the CEG report. We accept that the relationship between crude oil and nylon-11 is indirect and relies on the extent of competitive dynamics between polyethylene and nylon-11. This is a reason to consider that the escalation factors under this assumption may be quite imprecise. However, assuming zero real escalation without any supporting evidence or conceptual rationale is likely to be less precise.
>
> In the quote noted at paragraph 57 above, the AER acknowledges that there is no other reasonably simple method for arriving at estimates for the escalation path of nylon-11.
>
> [JGN NOTE: The AER had said in its ActewAGL draft decision that "...it would be difficult to create a better econometric model without entering into detailed analysis of the markets for crude oil, thermoplastic resin, polyethylene and nylon-11." [5]]

The AER final decision for ActewAGL appears to respond to the CEG comments quoted above. The final decision reasoning can be summarised as follows[6]:

[4] CEG, *Escalation factors affecting expenditure forecasts - A report for ActewAGL*, January 2010, p.13.

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

[6] AER, Final decision: Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network, March 2010, pp. 25-26. This section is quoted in full in attachment 2 item 3.

- The CEG econometric model forecasts changes in thermoplastic resin prices, not polyethylene prices. Polyethylene is only one of many thermoplastics. The CEG report does not demonstrate a relationship between polyethylene and thermoplastic resin prices.

- The fundamental driving factor behind the CEG report's forecast real cost escalators for nylon-11 is crude oil prices. However, unlike polyethylene which is derived from crude oil, nylon-11 is derived from castor oil.

- The only evidence presented in the CEG report to support the relationship between polyethylene and nylon-11 prices is the theoretical argument that the two materials are substitutes. No evidence is provided that the price of nylon-11 moves in line with changes in the price of polyethylene.

JGN wishes to respond to the AER draft decision for JGN in the matter of plastics escalators generally. Given that the ActewAGL final decision represents the most recent public statement by the AER on these matters, JGN's observations are informed by that decision.

3.4 Assumption of zero real escalation

JGN does not agree that the AER has responded adequately to CEG's position that assuming zero real escalation for plastic materials without any supporting evidence or conceptual rationale is likely to be less precise than CEG's own estimates, imprecise as they are; and CEG had acknowledged this imprecision.

The AER draft decision for ActewAGL effectively acknowledged that constructing a better econometric model than that produced by CEG would be a very detailed exercise, and would have to comprise analyses of four distinct markets and their interrelationships[7]. The CEG model was a compromise between a practical model and the excessive complexity required to produce a more detailed model.

As JGN has earlier noted, the AER's decision to reject the basis for the CEG escalators implies that any escalator which is greater than zero would be non-compliant with the NGR.

JGN maintains that the CEG escalators are consistent with the NGR. However, Section 4 below provides the foundation for an alternative approach which is equally consistent with the NGR.

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

4 PLASTIC PIPE ALTERNATIVES

4.1 General

The ActewAGL final decision purports to cast doubt on the relationship between polyethylene and nylon prices proposed by CEG, and refers to the 'theoretical argument' that the two materials are substitutes. In contrast, JGN submits that the two materials can be (and are) used interchangeably for many pipe-laying activities carried out on the JGN network.

JGN's general practice has been to use nylon for smaller diameter pipes up to 50 mm, most especially the services which link street mains to individual premises, while PE is used for larger diameter pipes. These are generalisations and there are exceptions.

4.2 Factors affecting choice of pipe

There are financial, operational and technical issues which enter into a comparison of polyamide (nylon) and polyethylene (PE) pipe for construction of mains and services in distribution systems. These introduce some complexity into cost analysis of PE versus nylon. There are multiple variables apart from the simple cost per linear meter, such as

- whole of life/asset management costs
- number of connections per meter
- surrounding network conditions
- supporting equipment, such as response trucks and tools.

While PE pipe is cheaper on a per metre basis, the factors noted above tend to favour nylon on an economic basis. However, PE and nylon are technically interchangeable. In general, nylon is used in high density applications on the existing network, while polyethylene is used for network backbone applications. On the other hand, remote networks can use either polyethylene or nylon.

While JGN practice has favoured nylon as the preferred material for smaller pipe sizes on the basis of total cost, it is clear that that (a) JGN uses both PE and nylon, (b) PE is considered the preferred material for use in some well-defined situations, and (c) that PE is a close contender with nylon for several situations. JGN continually monitors PE and nylon alternatives.

4.3 Projected use of PE and nylon

The projected comparative use of PE and nylon on the JGN network over the access arrangement period 2011- 2015 is:

Table 1: JGN percentage use of nylon and PE pipe – based on annual length (metres)[8]

	2011	2012	2013	2014	2015
Nylon (all types)					
PE					
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

In terms of length, PE is predominant over the above period. This is largely due to large-diameter pipe (110mm and above) being required for network construction activity (e.g feeder mains) which is independent of high density nylon applications. Some use of 110mm nylon is projected but this is very small compared with PE.

While PE is somewhat cheaper than nylon on a per unit basis, the sheer volume of PE usage described above means than projected dollar expenditure on PE far outweighs expenditure on nylon.

From the above split, and for reasons given in the next section, JGN estimates that the total percentage of petroleum-based plastic used on the JGN network is at least 90 per cent (based on length).

4.4 Distinction between nylon pipe types used on JGN network

Much of the AER's reasoning in its draft and final decisions involves drawing a sharp contrast between plastic pipe derived from petroleum products (polyethylene) and nylon pipe (represented by nylon-11) which is derived from non-petroleum products. The AER has questioned whether there can be any logical link between them. For example, the ActewAGL final decision says[9]:

> The CEG report does not demonstrate a relationship between polyethylene and thermoplastic resin prices. Second, the fundamental driving factor behind the CEG report's forecast real cost escalators for nylon-11 is crude oil prices. However, unlike polyethylene which is derived from crude oil, nylon-11 is derived from castor oil

JGN submits that there are facts concerning nylon which have not been fully clarified and which are relevant to the AER's draft decision on plastics escalators for JGN[10]. In particular, further investigation by JGN has determined that nylon is a subset of the extensive class of polyamides. There is a polyamide 12 grade of product (PA 12) used to make nylon pipe, and whose origins can be traced back to petroleum. There is also a polyamide 11 grade of product (PA 11) used to make nylon pipe, and whose origins can be traced back to non-petroleum sources.

[8] Prepared for JGN access arrangenet submission in August 2009.

[9] AER, Final decision: Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network, March 2010, p. 26.

[10] For example, the statement in the AER draft decision for JGN that 'JGN predominantly uses nylon-11 pipes' is not correct.

The key point is that JGN uses both types of nylon pipe on its network. In recent history, JGN estimates that it has been supplied with an approximate 50:50 mix of polyamide 12 and polyamide 11 by the predominant manufacturer of nylon pipe. This percentage is not absolute; but JGN understands that it derives from a decision of the manufacturer not be reliant on one source of nylon product, given that there was only one world producer for each source of raw material; specifically:

- PA11 is supplied by Arkema in France whose process derives the material from castor oil (product name "Rilsan")

- PA12 is supplied by Ube in Japan (product 3035UF)

JGN submits that this mix of nylon pipe, considered together with the volume of use of PE on the JGN network, makes an attempt at distinguishing between petroleum and non-petroleum sources of plastic pipe for JGN irrelevant for the purpose of deriving a general plastic cost escalator. This is because some 90 per cent of JGN's plastic piping can be traced to petroleum inputs.

Appendix 1 provides more background on this important issue of different types of nylon pipe.

Given that some 90 per cent of JGN's plastic piping is traceable to petroleum inputs, JGN considers that its proposed CEG escalator forecasts[11] are the best available in the circumstances and are arrived at on a reasonable basis.

[11] That is, the polyethylene escalators in the CEG report on cost escalators submitted as part of JGN's initial response to the draft decision (appendix 3b.5).

5 Plastic pipe costs generally

As stated in section 4, JGN considers that its proposed CEG plastic escalator forecasts are the best available in the circumstances and are arrived at on a reasonable basis. Notwithstanding this view, JGN submits that, if the AER does not accept the CEG plastics escalators, an alternative (non-zero) approach is required. JGN submits that, historically, the price escalation of polyethylene piping has been well in excess of Australian inflation. The pricing of nylon piping has been more sporadic, and is governed by JGN intermittent contractual agreements (including price escalation) with the single supplier of this material.

This submission assembles price escalation information from two sources:

- price index numbers of plastic raw materials imported into Australia (based on appendix 2)
- the recent history of price increases by plastic piping suppliers to JGN and its contractors.

JGN has then compared these pricing trends with Australian CPI.

5.1 Prices of imported plastic products

The ABS produces a series of international trade price indexes for Australia based on the Standard International Trade Classification (SITC) issued by the United Nations. The indexes potentially relevant to this submission are import prices for plastics in primary form (item 57) and import prices for plastics in non-primary form (item 58). Appendix 2 includes a listing of the products comprising each index.

JGN has confirmed with providers of plastic pipe supplied for the JGN network that the pipe is produced here from imported raw materials. The relevant import price index is therefore item 57.

Appendix 2 indicates that the products included in item 57 are diverse, and are not necessarily restricted to materials used by JGN. However, JGN's intention is simply to investigate whether the prices of these products – as a proxy for plastics used by JGN – have increased above (Australian) inflation. Since pipe manufacturers will attempt to pass on all costs of raw materials, exchange rate effects should not be excluded from the comparisons.

The prices of item 57 have clearly fluctuated over time, with periods of relatively strong growth and some decline. The table and graph below show long term trends.

The following table matches prices of plastic imports against:

- the prices of all imported goods (i.e. excluding services), as measured by an ABS implicit price deflator

- Australian CPI

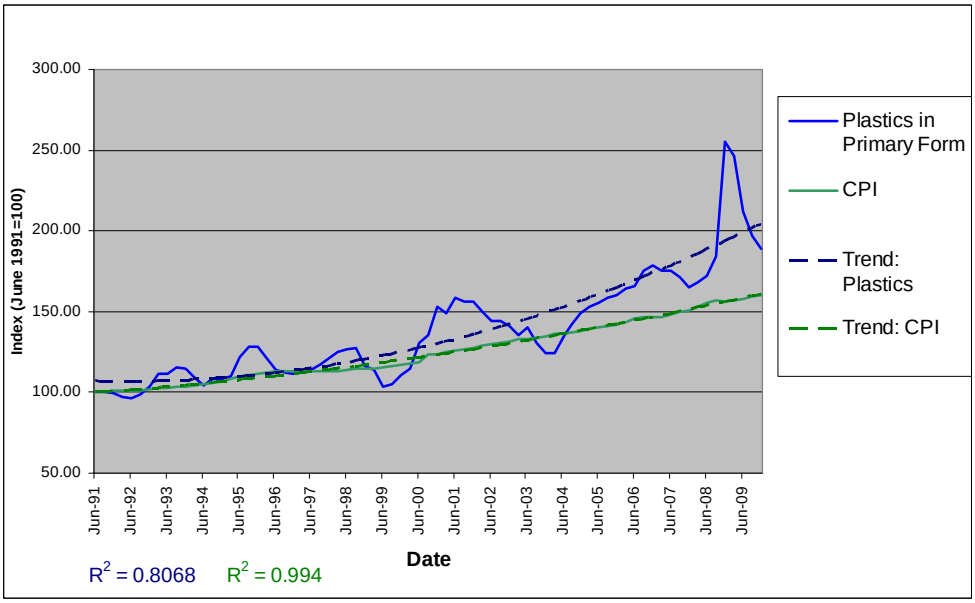
The results are:

Table 2: Comparison of ABS price index of imported plastics in primary forms and Australian CPI

Period	Plastics in primary forms	Implicit price deflator, imported goods	CPI, all groups, Australia
June 1991 index	94.6	108.4	106.0
December 2009 index	179.1	96.4	169.5
Per cent change 1991-2009	**+89.3**	**-11.1**	**+54.7**

JGN concludes that import prices of primary plastic products have exceeded Australian CPI increases over a long period. More recently, import prices increased very strongly in late 2008, perhaps reflecting general increases in raw materials prices at that time.

Graph 1: Comparison of ABS price index of imported plastics in primary forms and Australian CPI, 1991 - 2009



5.2 Price increases by PE pipe suppliers

JAM maintains substantial lists of potential pipe suppliers and pipelaying contractors. A significant PE pipe supplier to contractors is Vinidex Pty Limited, who (among other things) manufactures PE pipe and associated products from imported raw materials.

Pipelaying contractors are advised periodically of price increases and JAM has obtained recent advices issued by Vinidex to pipe users. Price increases are not at regular intervals, but are in response to external impacts, such as raw material increases or other cost increases.

A listing of price increases of specific PE products is given below.

Table 3: Price increases of polyethylene piping and other products advised by large PE pipe supplier to JGN contractors

Date	Product/s	Price increase
1 August 2006	Plasson PE fittings	Up to 4%
1 April 2007	Plasson PE compression fittings	+4%
1 May 2007	All PE products excluding Plasson fittings	+2%
1 October 2007	All PE pipes	+6%
1 September 2008	All PE pipes	8%
1 October 2008	All PE pipes	Up to 10%
1 September 2009	All PE pipes	Up to 5%
1 February 2010	All PE pipes	+10%
1 April 2010	All PE pipes	+7%

The above information indicates a cumulative price increase from May 2007 to date of at least 48 per cent. However, CPI increased from the March quarter 2007 to December quarter 2009 by only 9%. Thus, the recent price history of PE pipe used by JGN has greatly exceeded CPI increases.

5.3 Price increases by nylon plastic pipe supplier

The only supplier of nylon (polyamide 11 and 12) gas pipe for the JGN network is Georg Fischer Pty Ltd of Sydney, although Fischer supplies many other products besides nylon, including PE.

Documented price increases from Fischer were sporadic over the 2007-2008 period, with pipe costs rising by 4 per cent, while Nylink glue rose by 22 per cent.

In August 2009, JGN and Georg Fischer signed an agreement for the future supply and delivery of nylon pipe. The agreement continues for one year (to 2010) with an option for extension.

Base pipe prices were fixed for one year, but prices are subject to fluctuations in raw materials for the duration of the contract.

In seeking to gauge what escalation might apply under this contract, JGN notes that at least half of the nylon pipe and materials supplied are likely to be derived from petroleum-based sources. JGN therefore submits that an escalator linked in some way to crude oil is appropriate.

5.4 Pipe cost escalation generally for JGN

As noted in section 4.4, given that some 90 per cent of JGN's plastic piping is traceable to petroleum inputs, JGN maintains that its proposed CEG escalator forecasts[12] are the best available in the circumstances and are arrived at on a reasonable basis. These escalators (based on crude oil futures) determined that non-zero real escalation should apply. Supporting these projections, JGN points to historical evidence which demonstrates that, for plastic pipe material used on the JGN network, real price escalation has been greater than zero.

[12] That is, the polyethylene escalators in the CEG report on cost escalators submitted as part of JGN's initial response to the draft decision (appendix 3b.5).

6 APPENDIX 1: DISTINCTION BETWEEN NYLON PIPE TYPES USED ON JGN NETWORK

6.1 History of use of polyamides on JGN network

During the early 1980's, a project was initiated to rehabilitate the corroded ferrous mains in Sydney with a polyamide 11 solvent bonded system operating at 7 kPa (1 psig). Over the same period, polyamide replaced polyethylene for new and replacement gas reticulation work up to and including 110 mm operating at 210 kPa (30 psig). Following the success of polyamide 11 pipe during the 1980's, a large scale project begun in 1988 to insert the whole of Sydney's low pressure ferrous gas distribution network. The new polyamide 11 system was designed to operate at 210 kPa (30 psig).

In the mid eighties, AGL identified polyamide 12 as a possible alternative to polyamide 11 due to economic benefits and flexibility of supply.

In 1987, the Australian standards AS 2943, "Plastics Pipes and Fittings for Gas Reticulation – Polyamide Compounds for Manufacture" and AS 2944 , "Plastics Pipes and Fittings for Gas Reticulation – Polyamide, Part 1 –Pipes, Part 2 – Fittings" were developed. These standards outline the requirements for polyamide materials and pipe and fittings produced from polyamide materials operating at pressures up to 4 bar (58 psig).

In 1995, an evaluation was completed on UBESTA 3035 UF, a polyamide 12 grade from UBE Industries, Ltd. The evaluation demonstrated compliance with the relevant Australian standards and allowed polyamide 12 to enter the market.

Approximately 50% of the total annual volume of pipe installed is polyamide 12 and specifically, UBESTA 3035 UF. Most typically, 32 mm SDR 25 polyamide 12 pipe is installed.

6.2 Technical note – the derivation of nylon from petroleum

Benzene is a major product of the petrochemical industry. It is considered to be the most important and versatile aromatic compound. The chemical structure of benzene consists of six (6) carbon atoms arranged in a hexagonal ring to each of which a hydrogen atom is attached (C6H6). There are three double bonds in the benzene ring, and this unsaturation greatly contributes to its chemical reactivity. As a result, it is a very useful building block in the synthesis of other chemicals.

Primary derivatives of benzene that have large volume commercial use are ethylbenzene, cumene, **cyclohexane**, and nitrobenzene.

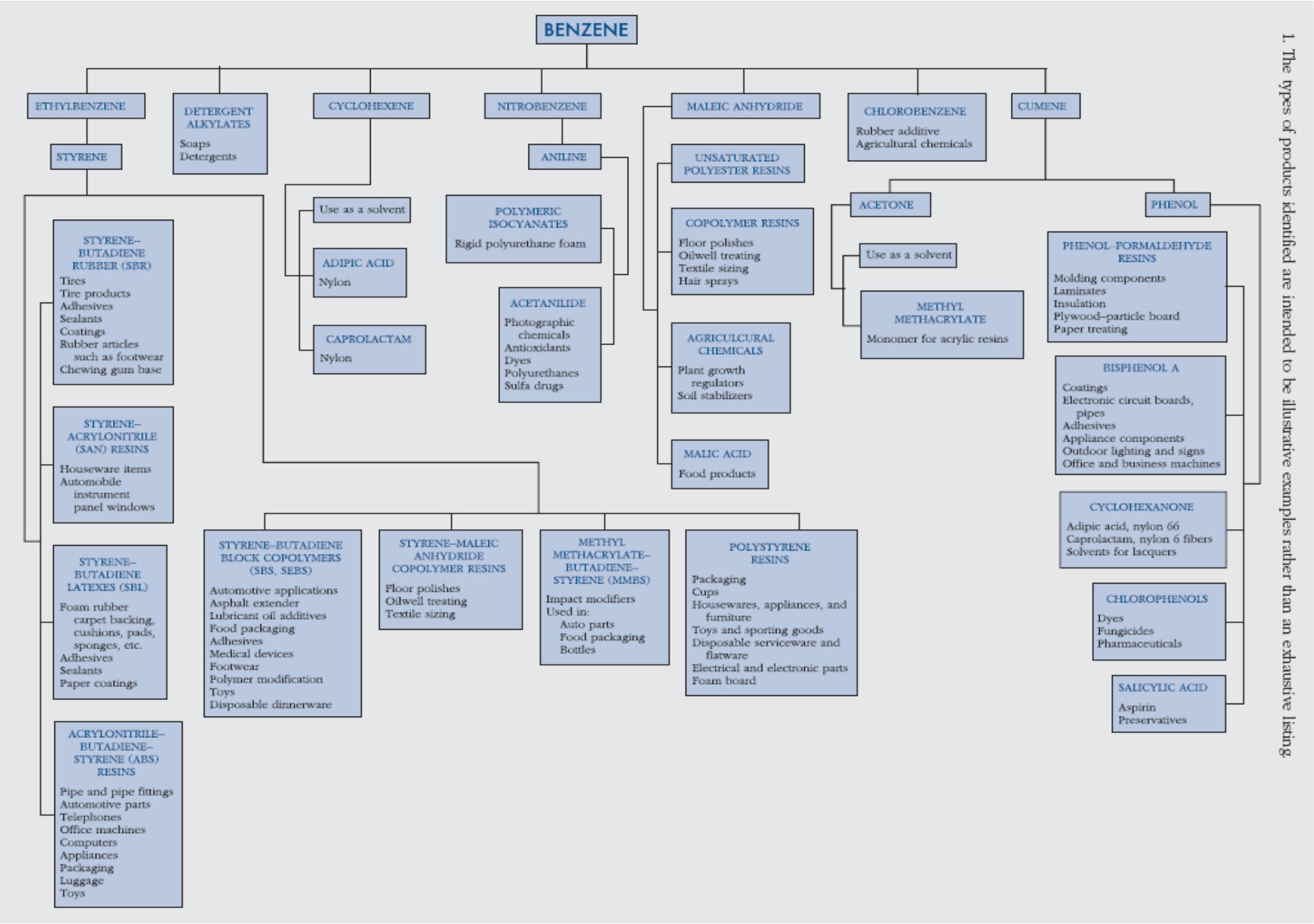
Cyclohexane has the molecular formula C6H12 and is used as a nonpolar solvent for the chemical industry, and also as a raw material for the industrial production of adipic acid and caprolactam, both of which are intermediates used in the production of nylon.[13]

Nylons are condensation copolymers formed by reacting equal parts of a diamine and a dicarboxylic (adipic) acid, so that peptide bonds form at both ends of each monomer in a process analogous to polypeptide biopolymers. Chemical elements included are carbon, hydrogen, nitrogen, and oxygen.

The diagram below (obtained from the Shell Chemicals literature) indicates the transition from benzene to nylon.

[13] The following link to the Chevron Phillips Chemicals site gives further information on cyclohexane: http://www.cpchem.com/enu/aromatics_p_Cyclohexane.asp

FIGURE 1.3: MAJOR BENZENE END USES[1]



1. The types of products identified are intended to be illustrative examples rather than an exhaustive listing.

7 APPENDIX 2: ABS INTERNATIONAL TRADE PRICE INDEXES, AUSTRALIA - IMPORT PRICE INDEX BY SITC, INDEX NUMBERS FOR PLASTICS; AND JGN COMPARISONS WITH SELECTED PRICE INDICES

	SITC Index Number 57 - Plastics in primary forms	SITC Index Number 58 - Plastics in non-primary forms	ABS CATALOGUE 5302.0 - Balance of Payments and International Investment Position, Australia Table 6. Goods and services: chain volume measures and indexes - Implicit Price Deflators; Goods debits	ABS CATALOGUE 6401.0 - Consumer Price Index, All groups ; Australia Tables 3 and 4
Series ID	**A2295858V**	**A2295861J**	**A3534913A**	**A2325846C**
Jun-1991	94.6	94.6	108.4	106.0
Sep-1991	94.8	94.4	107.0	106.6
Dec-1991	94.5	93.3	107.3	107.6
Mar-1992	91.7	94.4	109.5	107.6
Jun-1992	91.3	93.4	109.1	107.3
Sep-1992	93.7	95.7	113.6	107.4
Dec-1992	97.7	99.3	117.2	107.9
Mar-1993	105.3	102.6	117.5	108.9
Jun-1993	105.8	99.4	118.1	109.3
Sep-1993	109.0	104.5	121.4	109.8
Dec-1993	108.6	106.4	120.8	110.0
Mar-1994	103.4	103.4	115.7	110.4
Jun-1994	98.4	103.6	114.6	111.2
Sep-1994	102.1	110.8	114.7	111.9
Dec-1994	102.1	108.2	112.0	112.8
Mar-1995	104.2	112.4	115.0	114.7
Jun-1995	115.4	115.0	119.3	116.2
Sep-1995	121.7	120.5	118.2	117.6
Dec-1995	121.0	123.5	116.1	118.5

	SITC Index Number 57 - Plastics in primary forms	SITC Index Number 58 - Plastics in non-primary forms	ABS CATALOGUE 5302.0 - Balance of Payments and International Investment Position, Australia Table 6. Goods and services: chain volume measures and indexes - Implicit Price Deflators; Goods debits	ABS CATALOGUE 6401.0 - Consumer Price Index, All groups ; Australia Tables 3 and 4
Mar-1996	114.3	123.4	114.0	119.0
Jun-1996	107.9	119.4	108.5	119.8
Sep-1996	106.2	114.8	106.6	120.1
Dec-1996	105.3	114.0	105.0	120.3
Mar-1997	106.3	113.4	104.6	120.5
Jun-1997	107.4	113.2	102.8	120.2
Sep-1997	111.0	108.9	104.5	119.7
Dec-1997	114.5	113.0	108.4	120.0
Mar-1998	118.0	119.5	109.6	120.3
Jun-1998	120.1	129.7	110.8	121.0
Sep-1998	120.5	130.0	113.9	121.3
Dec-1998	110.3	125.5	111.1	121.9
Mar-1999	107.6	128.8	107.3	121.8
Jun-1999	98.1	119.6	104.4	122.3
Sep-1999	99.2	116.8	104.0	123.4
Dec-1999	104.5	120.8	106.2	124.1
Mar-2000	108.7	123.4	106.3	125.2
Jun-2000	123.5	129.2	112.8	126.2
Sep-2000	128.1	133.4	113.8	130.9
Dec-2000	144.5	140.7	121.0	131.3
Mar-2001	140.8	142.4	118.4	132.7
Jun-2001	149.8	146.8	122.3	133.8
Sep-2001	148.1	143.1	119.7	134.2
Dec-2001	147.6	146.7	118.9	135.4
Mar-2002	142.0	149.5	114.5	136.6
Jun-2002	136.8	143.5	113.2	137.6

	SITC Index Number 57 - Plastics in primary forms	SITC Index Number 58 - Plastics in non-primary forms	ABS CATALOGUE 5302.0 - Balance of Payments and International Investment Position, Australia Table 6. Goods and services: chain volume measures and indexes - Implicit Price Deflators; Goods debits	ABS CATALOGUE 6401.0 - Consumer Price Index, All groups ; Australia Tables 3 and 4
Sep-2002	136.5	149.0	113.3	138.5
Dec-2002	133.5	147.1	113.0	139.5
Mar-2003	128.0	141.6	110.7	141.3
Jun-2003	132.5	132.9	104.6	141.3
Sep-2003	123.3	129.6	101.1	142.1
Dec-2003	117.6	124.1	97.7	142.8
Mar-2004	117.4	111.1	94.2	144.1
Jun-2004	127.3	116.7	98.1	144.8
Sep-2004	134.5	119.0	100.4	145.4
Dec-2004	141.1	113.6	99.0	146.5
Mar-2005	144.7	111.4	96.3	147.5
Jun-2005	147.3	114.4	98.1	148.4
Sep-2005	149.9	115.5	100.0	149.8
Dec-2005	151.4	115.7	100.8	150.6
Mar-2006	155.1	120.3	102.3	151.9
Jun-2006	156.5	118.0	104.9	154.3
Sep-2006	165.9	116.4	104.4	155.7
Dec-2006	169.3	114.0	101.5	155.5
Mar-2007	166.3	108.0	99.7	155.6
Jun-2007	165.9	107.6	99.5	157.5
Sep-2007	162.4	107.3	98.5	158.6
Dec-2007	156.4	103.2	98.4	160.1
Mar-2008	159.3	102.7	101.0	162.2
Jun-2008	162.6	101.0	102.0	164.6
Sep-2008	174.1	112.3	106.9	166.5
Dec-2008	241.7	139.8	118.4	166.0

	SITC Index Number 57 - Plastics in primary forms	SITC Index Number 58 - Plastics in non-primary forms	ABS CATALOGUE 5302.0 - Balance of Payments and International Investment Position, Australia Table 6. Goods and services: chain volume measures and indexes - Implicit Price Deflators; Goods debits	ABS CATALOGUE 6401.0 - Consumer Price Index, All groups ; Australia Tables 3 and 4
Mar-2009	233.5	132.9	115.7	166.2
Jun-2009	200.8	131.4	104.3	167.0
Sep-2009	186.7	123.3	101.2	168.6
Dec-2009	179.1	119.2	96.4	169.5

7.1 WEB LINKS TO PLASTICS IMPORT DATA

ABS IMPORT PRICES - PLASTICS

ABS WEBSITE: CATALOGUE 6457.0 – INTERNATIONAL TRADE PRICE INDEXES, AUSTRALIA, DECEMBER 2010 – TABLES 1, 3 AND 12

ITEMS 57 AND 58

http://www.ausstats.abs.gov.au/ausstats/meisubs.nsf/0/597390AA98ED82E9CA2576B200168466/$File/645701.xls

DEFINITIONS OF PLASTICS

UNITED NATIONS STATISTICS DIVISION

Detailed structure and explanatory notes - SITC (Standard International Trade Classification, Rev.3)

Plastics item 57:

http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=14&Lg=1&Co=57

This Division is divided into the following Groups:

571 - Polymers of ethylene, in primary forms

572 - Polymers of styrene, in primary forms

573 - Polymers of vinyl chloride or of other halogenated olefins, in primary forms

574 - Polyacetals, other polyethers and epoxide resins, in primary forms; polycarbonates, alkyd resins, polyallyl esters and other polyesters, in primary forms

575 - Other plastics, in primary forms

579 - Waste, parings and scrap, of plastics

Plastics item 58:
http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=14&Lg=1&Co=58

This Division is divided into the following Groups:

581 - Tubes, pipes and hoses, and fittings therefor, of plastics

582 - Plates, sheets, film, foil and strip, of plastics

583 - Monofilament of which any cross-sectional dimension exceeds 1 mm, rods, sticks and profile shapes, whether or not surface-worked but not otherwise worked, of plastics

ABS IMPORT IMPLICIT PRICE DEFLATOR

5302.0 - BALANCE OF PAYMENTS AND INTERNATIONAL INVESTMENT POSITION, AUSTRALIA, DEC 2009

http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5302.0Explanatory%20Notes1Dec%202009?OpenDocument

SEE: Table 6, item 30: Goods debits

(Extracts)

This publication presents comprehensive details of Australia's international accounts: its balance of payments and international investment position statistics.

CHAIN VOLUME MEASURES

To enable analysis of the movement of goods and services in 'real' terms, estimates of chain volume measures are compiled and published each quarter. Chain volume measures are derived by deflating the original current price series by specially compiled measures of price change.

IMPLICIT PRICE DEFLATOR (IPD)

The quarterly implicit price deflators (IPDs) are derived by dividing current price estimates by the corresponding chain volume measures. Movements in IPDs can be greatly affected by changes in the physical composition of the aggregates and their components. The quarterly IPDs derived from seasonally adjusted data are preferred to those using original data because the seasonal adjustment process removes some of the seasonal changes in the composition of this series. However, the seasonal adjustment process itself is also a possible source of distortion.

8 APPENDIX 3: AER DRAFT and FINAL DECISIONS ON POLYETHYLENE - NYLON-11 ESCALATOR

8.1 JEMENA GAS NETWORKS DRAFT DECISION (pp. 63-64)

Jemena predominantly uses nylon-11 pipes but as the CEG cost escalators report notes there is no liquid futures market or long-term price forecast available for this material. The CEG cost escalators report also notes that polyethylene is a substitute for the use of nylon-11 in gas mains and that some gas network providers in Australia use polyethylene pipes in preference to nylon-11. The CEG cost escalators report proposes that polyethylene prices are a reasonable substitute for forecasting nylon-11 prices.

In order to forecast the real cost escalators for polyethylene over the access arrangement period, Jemena proposes a two stage process. First, Jemena demonstrates a historical relationship between crude oil prices and thermoplastic resin (which includes polyethylene) prices using an econometric model. Second, the historical relationship is used to create a forecast price index for thermoplastic resin. Forecasting over the access arrangement period is possible as crude oil futures prices are available from the New York Mercantile Exchange (NYMEX) until 2017.

The AER considers that the econometric model proposed by Jemena appears to out perform other models considered by Jemena's consultants.

The AER has identified two weaknesses with Jemena's proposed method for forecasting a real price escalator for nylon-11. The first is the implied relationship between nylon-11 and crude oil. The second is the construction of the forecast price index.

The AER remains unconvinced about the validity of the relationship between nylon-11 and crude oil, as crude oil is not an input into the production of nylon-11. The AER notes that neither Jemena's submission nor the CEG cost escalators report provides sufficient evidence to support a relationship between nylon-11 and crude oil prices other than the fact that nylon-11 and polyethylene are substitutes. The AER does not consider that the escalator has been arrived at on a reasonable basis.

The AER also reviewed the basis for establishing the forecast price index. The first stage estimates the historical relationship between crude oil prices and thermoplastic resin prices and to do so uses price indexes from the Bureau of Labour Statistics. These price indexes show changes in nominal prices paid by producers for these commodities. However, when forecasting the price index for

polyethylene, the forecast crude oil price index is based on the change in real crude oil prices denominated in Australian dollars.

The AER does not consider this approach is appropriate as the estimated relationship between crude oil prices and thermoplastic resin prices includes the effects of inflation. This is because the relationship is based on nominal prices. Applying this approach leads to double counting of inflation as the forecast price, which includes the influence of inflation, is inflated again in the calculation of revenue. Further, the AER considers that financial information and calculations should be done on a consistent basis as required under r. 73(3) of the NGR. However, Jemena's proposal uses different bases for the forecast price index by using a nominal price index based on US dollars to develop the econometric model and a real price index based on Australian dollars to develop the forecast price index.

As the relationship between nylon-11 and polyethylene has not been clearly established and there is the potential for double counting of inflation, the AER does not consider that the method proposed by Jemena for forecasting a price index for polyethylene represents the best forecast or estimate possible in the circumstances as required by r. 73(3) of the NGR and r. 74(2) of the NGR. As such, the AER does not accept Jemena's proposed real cost escalator for polyethylene.

8.2 ACTEWAGL DISTRIBUTION DRAFT DECISION (p. 38-39)

The CEG cost escalators report notes that polyethylene is a substitute for the use of nylon-11 for use in gas mains and that some gas network providers in Australia use polyethylene pipes in preference to nylon-11. The CEG cost escalators approach notes that ActewAGL predominantly uses nylon-11 pipes but the CEG finds that there is no liquid futures market or long-term price forecast available for this material. Therefore, the CEG cost escalators report submits that polyethylene prices are a reasonable substitute for forecasting nylon-11 prices.

In order to forecast the real cost escalators for polyethylene over the access arrangement period, ActewAGL proposes a two stage process. First, ActewAGL seeks to demonstrate a historical relationship between crude oil prices and thermoplastic resin (which includes polyethylene) prices using an econometric model. This historical relationship is then used to create a forecast price index for thermoplastic resin. Forecasting over the access arrangement period is possible as crude oil futures prices are available from NYMEX until 2017.

The AER considers that the econometric model proposed by ActewAGL appears to out perform other models considered by ActewAGL's consultants. The AER considers that it would be difficult to create a better econometric model without entering into detailed analysis of the markets for crude oil, thermoplastic resin, polyethylene and nylon-11.

The AER considers that there are two main weaknesses with ActewAGL's proposed method for forecasting a real price escalator for nylon-11. The first is the implied relationship between nylon-11 and crude oil. The second is the construction of the forecast price index.

The AER's first concern is the validity of the relationship between nylon-11 and crude oil, as crude oil is not an input into the production of nylon-11. The AER notes that neither ActewAGL's submission nor the CEG cost escalators report present evidence to support a relationship between nylon-11 and crude oil prices other than the fact that nylon-11 and polyethylene are substitutes.

Second, the AER has considered the construction of the forecast price index. There are two stages involved in the creation of the forecast price for polyethylene. The first stage is the demonstration of a historical relationship between thermoplastic resin and crude oil prices. This stage involves the quantification of the historical relationship and is done using an econometric model. The second stage uses the historical relationship to construct a forecast price index, which involves inputting forecast crude oil price changes into the econometric model to develop forecast polyethylene price changes.

The AER notes that the first stage, which estimates the historical relationship between crude oil prices and thermoplastic resin prices, uses price indexes from the Bureau of Labour Statistics. These price indexes show changes in nominal prices paid by producers for these commodities. However, when forecasting the price index for polyethylene, the forecast crude oil price index is based on the change in real crude oil prices denominated in Australian dollars.

The AER does not consider this approach to be appropriate as the estimated relationship between crude oil prices and thermoplastic resin prices includes theeffects of inflation, as the relationship is based on nominal prices. As this approach may lead to double counting of inflation as the forecast real price is inflated in the PTRM model. Further, the AER does not consider it appropriate to change data series, from a nominal price index based on US dollars to a real price index based on Australian dollars, between the estimation of the econometric model and its application to develop a forecast price index.

As there is the potential for double counting of inflation, the AER does not consider the method proposed by ActewAGL for forecasting a price index for polyethylene represents the best forecast or estimate possible in the circumstances in accordance with r. 74(2) of the NGR.

8.3 ACTEWAGL FINAL DECISION (pp. 25-26)

Polyethylene

ActewAGL submits a report by the Competition Economics Group (the CEG cost escalator report) to address the two concerns raised in the draft decision regarding the use of the cost escalator for polyethylene, namely:

- ActewAGL's approach leads to double counting of inflation

- ActewAGL provides insufficient evidence of the relationship between the prices of crude oil and nylon–11 (which ActewAGL submits is a reasonable substitute for polyethylene).

ActewAGL submits that the CEG cost escalator report addresses the first concern by using forecast crude oil price movements expressed in nominal dollars. Further, ActewAGL submits that the CEG cost escalator report addresses the second concern by putting forward further evidence of the relationship between crude oil and nylon– 11 prices by obtaining a long term monthly pricing history for crude oil and thermoplastic resins (of which polyethylene is one) from the United States Bureau of Labour Statistics from July 1991 to October 2009.

Draft decision analysis

In the draft decision, the AER raises two concerns with the derivation of the proposed cost escalator for polyethylene:

- insufficient evidence is presented of the relationship between nylon-11 and polyethylene prices

- parameters used in the econometric model are estimated using one set of data, based on nominal prices, while forecasts from the model were made using a different set of data based on real prices, resulting in double counting of inflation.

The AER considers that the CEG report on cost escalators has addressed the second issue raised by the AER but has not addressed the first.

The key relationship that needs to be demonstrated is one between polyethylene and nylon-11 prices. However, the CEG report presents no evidence of any relationship between polyethylene and nylon-11 prices. Instead, the CEG report's econometric model is based on the relationship between thermoplastic resin prices and crude oil prices. This raises two concerns. First, the econometric model forecasts changes in thermoplastic resin prices, not polyethylene prices. Polyethylene is only one of many thermoplastics. The CEG report does not demonstrate a relationship between polyethylene and thermoplastic resin prices. Second, the fundamental driving factor behind the CEG report's forecast real cost escalators for nylon-11 is crude oil prices. However, unlike polyethylene which is derived from crude oil, nylon-11 is derived from castor oil.

The only evidence presented in the CEG report to support the relationship between polyethylene and nylon-11 prices is the theoretical argument that the two materials are substitutes. No evidence is provided that the price of nylon-11 moves in line with changes in the price of polyethylene. Economic theory does indicate that, in a competitive market, prices of substitutes move together. This happens as increased prices of one of the goods leads to increased demand for the other

good. However, the CEG cost report indicates that there is only one supplier of nylon-11 in Australia. Economic theory indicates that changes in demand for substitutes in a monopoly market do not necessarily lead to the same change in price that would be expected in a competitive market. This means that, in a monopoly market, prices of substitutes do not necessarily move together.

In light of the above, the AER considers that the proposed cost escalator for polyethylene is not arrived at on a reasonable basis as required by r. 74(2)(a) of the NGR, as ActewAGL has not proven empirically or theoretically the assumed economic relationship between substitutes underlying the forecast. The AER does not consider that ActewAGL's proposed cost escalator for polyethylene results in capital expenditure that would be incurred by a prudent service provider operating efficiently, in accordance with good industry practice, to achieve the lowest sustainable cost of providing services.

8.4 COUNTRY ENERGY GAS PTY LTD DRAFT DECISION (pp. 27-28)

Polyethylene

Polyethylene is also a key input into Country Energy's proposed capital expenditure forecasts. This is because polyethylene pipes are used by Country Energy in its pipeline replacement program.

In order to forecast the real cost escalators for polyethylene over the access arrangement period, Country Energy proposes a two stage process. First, Country Energy seeks to demonstrate a historical relationship between crude oil prices and thermoplastic resin (which includes polyethylene) prices using an econometric model. This historical relationship is then used to create a forecast price index for thermoplastic resin. Forecasting over the access arrangement period is possible as crude oil futures prices are available from NYMEX until 2017.

The AER considers that the econometric model proposed by Country Energy appears to out perform other models considered by Country Energy's consultants. The AER does not consider, however, that this ensures that the forecast price index is the best possible forecast available in the circumstances, as set out in r. 74(2)(b) of the NGR.

The AER has considered the construction of the forecast price index. There are two stages involved in the construction of the forecast price for polyethylene. The first stage is the demonstration of a historical relationship between thermoplastic resin and crude oil prices. This stage also involves the quantification of the historical relationship and is done using an econometric model. The second stage uses the historical relationship to construct a forecast price index, which involves inputting forecast crude oil price changes into the econometric model to develop forecast polyethylene price changes.

The AER notes that the first stage, the estimation of the historical relationship between crude oil prices and thermoplastic resin prices, is done using price indexes from the Bureau of Labour Statistics.116 These price indexes show changes in nominal prices paid by producers for these commodities. However, when forecasting the price index for polyethylene the forecast crude oil price index is based on the change in real oil prices denominated in Australian dollars.

The AER does not consider this approach to be appropriate as the estimated relationship between crude oil prices and thermoplastic resin prices includes the effects of inflation, as the relationship is based on nominal prices. The AER considers that this approach may lead to double counting of inflation as the forecast real price is inflated in the post tax revenue model (PTRM). Further, the AER does not consider it appropriate to change data series, from a nominal price index based on US dollars to a real price index based on Australian dollars, between the estimation of the econometric model and its application to develop a forecast price index.

As there is the potential for double counting of inflation, the AER does not consider the method proposed by Country Energy for forecasting a price index for polyethylene represents the best forecast or estimate possible in the circumstances in accordance with r. 74(2).

8.5 COUNTRY ENERGY FINAL DECISION

Country Energy did not contest the AER draft decision on polyethylene. The final decision says (p. 18):

> The AER notes that Country Energy has accepted the draft decision regarding the cost escalator for polyethylene.