AGL Gas Networks Limited
ACN 003 004 322

Access Arrangement Information for NSW Network

This Access Arrangement Information is submitted pursuant to Section 2.2 of the Code.

Pursuant to the Code, this document does not contain information the disclosure of which would be unduly harmful to the legitimate business interests of the Service Provider or a User or a Prospective User (such as forecasts). Accordingly, such information is not included in this Access Arrangement Information.

INTRODUCTION

This Access Arrangement Information (AAI) is designed to provide users and prospective users with an understanding of the derivation of the Reference Tariffs proposed in the Access Arrangement, and to fulfil the requirements of the Code with respect to Attachment A while not disclosing information the disclosure of which could be unduly harmful to the legitimate business interests of AGLGN, users or prospective users.

On this occasion, the Tribunal is to redetermine the Initial Capital Base (ICB) which was established in its July 1997 Determination.

The AAI is presented in four parts.

Part One outlines the Total Revenue Requirement. It has two Sections.

- Section One sets down important considerations in the redetermination of the ICB.

- Section Two provides information on operating costs, depreciation capital expenditure and rate of return.

Part Two describes the access and pricing principles that underpin the Reference Tariffs in the Access Arrangement.
Part Three outlines the physical characteristics of the distribution system including lengths, capacities, operating pressures, and customer numbers.

Part Four provides information regarding key performance indicators.

This AAI includes information relating to periods when the relevant network assets were owned by different entities (AGL, AGL Gas Companies). In order to avoid confusion, the name AGLGN has been used throughout.

PART ONE – CAPITAL AND OPERATING COSTS

SECTION ONE – THE REDETERMINATION OF THE INITIAL CAPITAL BASE

In its Final Determination on AGLGN's proposed Access Undertaking (July 1997), the Tribunal did not materially modify the Initial Capital Base it proposed in September 1996 ($1,200m expressed as Funds Employed), but indicated that it intended to redetermine the figure at the next review.

The NSW Access Code allows redetermination of the Initial Capital Base during the course of the first review (Section 9.5 and 9.6).

1.1. Methodology to be used in the redetermination.

In its September 1996 Draft Determination, the Tribunal determined the Initial Capital Base (ICB) by conducting a net present value (NPV) analysis of the forecast regulatory sustainable revenue stream for the gas distribution business.

In its Final Determination the Tribunal signalled that redetermination of the ICB would be based on the sustainable revenue stream and cross checked against other benchmarks of asset values:

> *At that time, uncertainties in the marketplace should have dissipated. The Tribunal should therefore be better able to assess the reasonableness of the revenue stream. At that time, information should be available which allows the Tribunal to cross check the asset valuation based on the sustainable revenue stream against other benchmarks of asset values (page 67).*

AGLGN has taken this as guidance for its approach to redetermination of the ICB for the purposes of determining Reference Tariffs.

In its Draft Decision regarding GSN's Access Arrangement, the Tribunal uses a NPV analysis of sustainable revenue streams to assess GSN's ICB. AGLGN has taken note of the methodology and assumptions used as an indicator of the Tribunal's current thinking on these matters.

1.2. Key Factors to be considered in the redetermination.

In its Final Determination on the AGLGN Access Undertaking the Tribunal provides insight into the factors which will govern its redetermination of the ICB:

> *The assessment at the next review will depend largely on the outcome of the Tribunal's tariff market review in 1998 and AGL's success in increasing its profitability in the tariff market (page xvi).*
>
> *.... a key factor for the future asset value will be AGL's success in lifting the profitability of the tariff market within current price constraints (page 70).*

The value of the Initial Capital Base following the review will depend largely on the levels of sustainable revenues and, in turn, on tariff market growth, competitive pressure on tariff market prices and regulatory and market pressures on contract market prices. It is possible that the review may lead to adjustments to some parts of the system which are greater or lesser than those to other parts of the system (page 72)

....the September 1996 present value analysis overstated the sustainable revenue stream on three counts. First, the network revenues in that analysis include retail costs and margins. Second, the present value analysis included revenues collected during the transitional period. Third, the September 1996 analysis did not adequately reflect the potential for cost savings in the network, as identified in the Greenwood Challoner report (page 70).

1.2.1 Comment on Key Factors identified by the Tribunal.

1.2.1.1 Profitability of the Tariff Sector; Tariff Sector Growth; Competitive Pressure on Tariff Prices

The tariff sector, especially household demand, continues to grow strongly, increasing by approximately 25,000 households annually. This is shown below:

Year	Net Customer Gains (pa)
1990-95	25,520
1996	30,630
1997	24,240
1998	25,770

AGLGN is now of the view that the household sector can sustain increases in prices, if this is necessary to increase the contribution made by it to total revenue (to remove any identified cross subsidy from contract customers).

In addition, AGLGN has reduced costs by ceasing non-essential activities, outsourcing non-core activities, and introducing process improvements. Operating costs of $131m in 1996/97 have been reduced to $124m in 1997/98.

The overall result of growth and cost reduction has been a significant fall in operating cost per customer, and a significant increase in operating margin from tariff customers as shown in the following table.

Year	Operating Cost per customer ($)	Operating Margin per household customer ($)
1996/97	190	88
1997/98	170	113

1.2.1.2 Market Pressures on Contract Customer Prices

Contract prices set by the Tribunal for the last regulatory period provided for significant reductions in overall cost recovery, down from $141m in 1996/97 to $117m, and $99m in 1997/98 and 1998/99 respectively.

These reductions were driven by the regulatory process. Given the reductions, contract prices are seen as sustainable.

1.2.1.3 Regulatory Pressures on Contract Prices

The Tribunal signalled in the Final Determination that cost recovery from contract customers should fall to $84m in 1999/2000. This represented the then current view of subsidy free contract revenue.

It is expected that the current view on subsidy free recovery of contract costs will be an important consideration in this review.

1.2.1.4 Retail Costs and Margins in Network Costs

Retail costs and margins identified by Greenwood Challoner were excluded from the cost base used in the calculation of the contract and tariff price paths approved by the Tribunal in the Final Determination. Retail activities, and related costs and margins, were transferred to retail companies from 1 July 1997 as part of AGLGN's response to its ringfencing obligations.

For the purposes of estimating network costs and network revenue for 1996/97 (when NSW network and retail operations operated as a 'bundled' business), the retail costs and margins identified by Greenwood Challoner have been removed from the combined retail/network business.

1.2.1.5 Revenues Collected during the Transitional Period

The Tribunal indicated in its Final Determination that the wedge of cash flow associated with the 'glide-path' from the then current contract revenues to the 'staging point' of $84m in 1999/2000 should be excluded from the calculation of the ICB. This was based on the then current assessment that $84m represented the subsidy-free contract revenue.

There is a similar subsidy free tariff revenue wedge which was not included, but which should be included in the calculation of the ICB. The Tribunal recognises this in its Final Determination:

> *The Tribunal recognises that the asset value supported by the present value of the sustainable revenue stream is the composite asset value for the system as a whole; it does not represent the value of either the high pressure system or the medium/low pressure system. It is possible for AGL's asset value to be enhanced through increased load (and revenues) in the tariff market to offset declining revenues in the contract market (page 17).*

With continued strong growth in tariff demand, AGLGN is now of the view that the tariff wedge could be increased by both increased tariff load (and revenue) and increased tariff prices (and revenue).

Even though the contract and tariff 'glide-paths' may be excluded from the determination of the ICB, this does not mean that there should be abrupt changes in prices in the marketplace. Prices could still follow a 'glide-path' in order to avoid price shocks.

It should also be noted that the Tribunal used a 'glide-path', rather than adjust for wedges, in its assessment of the ICB for GSN (Draft Decision page 41).

1.2.1.6 Cost Savings Identified by Greenwood Challoner

Cost savings identified by Greenwood Challoner were reflected in the calculation of the contract and tariff price paths approved by the Tribunal in the Final Determination. In addition, AGLGN has made additional savings to improve the profitability of the tariff sector. These savings are included in the analysis for redetermination of the ICB, and will form the base from which future costs will be determined.

1.2.2 Mistakes in the 1997 Final Determination which must be corrected in the redetermination.

There is no reference to mistakes in the Final Determination as factors in the redetermination of the ICB, but clearly there was no intention that identified mistakes should not be corrected.

On page 68 of the Final Determination the Tribunal made reference to AGLGN's assessment of DORC valuation – \$1850m based on economic depreciation; \$1450m based on straight line depreciation. Both of these numbers expressed DORC in terms of Funds Employed (not assets). The Tribunal rejected the assessment of DORC based on economic depreciation on the grounds that it was too subjective. In this light, errors and corrections for the \$1450m assessment only will be outlined.

1.2.2.1 Corrections to DORC

AGLGN's assessment of DORC was based on its valuation of assets employed as at July 1995, and on economic lives for assets which are inconsistent with those determined for similar assets in Victoria, and inconsistent with those proposed by GSN (Draft Decision page 69). This assessment needs to be corrected to reflect:

- the asset valuation commissioned by IPART (JP Kenny valuation);
- reoptimisation of the northern trunk (IPART);

- exclusion of Queanbeyan assets (which are now included in the Access Arrangement for the ACT);
- adjustment in applying Newcastle mains lay rates to Central Coast;
- assets not included by JP Kenny (Blue Mountains secondary system and others);
- meter sets (other than meters themselves) – which JP Kenny did not include; and
- current thinking on the economic life of gas assets.

These corrections are summarised below ($'000):

JP Kenny ORC	2438
Trunk reoptimised	(12)
Exclusion Queanbeyan assets	(15)
Newcastle mains lay rates to Central Coast	(1)
Adjustment for assets not included by Kenny	1
Adjustment for meter sets not included by Kenny	47
Net capital additions 1995/96	98
	2557
Depreciation (on economic life)	548
DORC (Network assets)	2009
Non-network assets	92
Net Working Capital	(270)
DORC (expressed as funds employed)	1831

1.2.2.2 Corrections to the calculation of the ICB

In formulating cash flows it is important to include expenditure which is consistent with the nature of the analysis. A NPV analysis of a sustainable revenue stream to determine an ICB must recognise that the ICB represents the value attributable to both debt and equity holders. A corollary to this is that expenditure by equity holders to replace debt should not be included in the cash flow used to determine the ICB.

The sustainable revenue stream used in 1997 to determine the ICB (of $1200m) mistakenly included as a cash expenditure the purchase by AGLGN of Goldline leases. This was AGLGN's mistake. The proposed expenditure was an investment by equity holders to replace debt and should not have been included in this analysis. The expenditure reduced the NPV of the sustainable revenue stream by $300M.

When this error is corrected, the ICB measured as the NPV of the sustainable revenue stream is $1500m (expressed as Funds Employed) or $1640m (expressed as Asset Valuation).

It should be noted that these corrections do not substantially alter the view of the ICB as a percentage of DORC (expressed as Funds Employed). This is shown below:

	Incorrect DORC	Corrected DORC
DORC	1450	1831
ICB	1200	1500
ICB/DORC	83%	82%

1.2.3 Matters to be taken into account in determining the Initial Capital Base (ICB).

The Code requires the Regulator to take into account a number of specific matters when determining the ICB, especially the Depreciated Actual Cost (DAC) and the Depreciated Optimised Replacement Value (DORC). In this section AGLGN makes comment on those matters which it considers are be relevant to the Regulator's determination.

1.3. Establishing the Capital Base

1.3.1 DAC, DORC and Net Working Capital (Code sections 8.6 (i), (ii) and (iv))

The following table summarises:

- replacement costs;
- depreciated replacement costs;
- optimised replacement costs;
- depreciated optimised replacement costs;
- depreciated actual costs; and
- net working capital

for AGLGN's network at 1 July 1997.

	1 July 1997
Total Network ($'m)	
Replacement Cost	
- Network Distribution Assets	2595
- Other Fixed Assets	180
- Net Working Capital	(270)
	2505
Depreciated Replacement Cost	
- Network Distribution	2039
Assets	92
- Other Fixed Assets	(270)
- Net Working Capital	1861
ORC	
- Network Distribution	2557
Assets	180
- Other Fixed Assets	(270)
- Net Working Capital	2467

DORC	
- Network Distribution	2009
Assets	92
- Other Fixed Assets	(270)
- Net Working Capital	1831
DAC	
- Network Distribution	967
Assets	92
- Other Fixed Assets	(270)
- Net Working Capital	789

Note that economic life used for the determination of depreciated replacement costs and depreciated optimised replacement costs is outlined in 2.2

1.3.2 Advantages and Disadvantages of Each Valuation Method (Code section 8.8(i))

There are several acknowledged cost based methods for valuing long term physical capital assets. These approaches include non optimised replacement cost, optimised replacement value (ORC), depreciated optimised replacement cost (DORC), optimised deprival value (ODV) and depreciated actual cost (DAC). The advantages and disadvantages of each are outlined in Attachment 2.

The Code states that the ICB should usually be between DORC and DAC.

A DORC capital valuation has been selected. DORC involves estimating the efficient cost of constructing the asset using current technology to meet current markets. This estimate is then depreciated to reflect the age of the asset.

Reasons for selecting DORC include:

- the optimisation inherent in DORC allows the benefits of technology to be passed on while the costs of excess assets are not passed on;
- it provides a consistent valuation between new and existing assets;.
- it sends correct price signals as to the cost of providing the service.
- DORC is consistent with the prices that would be charged by an efficient new entrant and hence is consistent with efficient pricing.

In relation to the Victorian gas assets both the ORG and the ACCC accepted the use of the DORC asset valuation methodology. They considered the methodology as:

(i) consistent with competitive market outcomes; and
(ii) providing for consistency between current and replacement asset costs.

1.3.3 The basis on which Tariffs have been set in the past, the depreciation of the Relevant Pipeline, and the historical returns to the Service Provider (Code section 8.8 (iii))

Natural gas was introduced into NSW in the 1976/77 financial year. This year has been taken as the starting point for addressing this matter. If analysis of earlier years is considered important then it is relevant to know that the restrictions on depreciation and profit pre-1977 were essentially the same as those that applied in 1977.

1.3.3.1 Previous Regulatory Systems

From 1977 to 1986 AGLGN was subject to a limit on the dividends it could pay to the Long Term Bond Rate (LTBR) plus 2% (LTBR plus 3% if the company was involved in the exploration, development and bulk carriage of natural gas). Furthermore it was not permitted to increase published tariffs (for tariff users) without the approval of the Minister following a Board of Enquiry. It was, however, free to increase prices to contract users (subject to the overall constraint on dividends)[1].

During this time, regulation limited the depreciation that could be charged on assets in total to 3% declining balance (equivalent to 2% straight line). That is, for regulatory purposes it was assumed that the average life of all assets – mains, services, meters, plant, motor vehicles, office furniture etc – was 50 years.

In 1986 economic regulation was lifted and imposed on AGLGN's gas activities. The constraint on dividend was removed and replaced with a constraint on profit of LTBR plus 2% (LTBR plus 3% if the company involved in the exploration and bulk carriage of natural gas). This profit constraint applied to shareholders funds (equity). As in the previous period, published tariffs could only be increased with the approval of the Minister following a Board of Enquiry. Prices to contract users were not subject to regulatory constraint.

Assets purchased before 1986 continued to be subject to depreciation over 50 years (regardless of class of asset). Assets purchased after 1986 were subject to the following rates of depreciation (main asset groups only):

Mains	2%
Services	5%
Meters	6.6%
Vehicles	20%

The above system of regulation was altered in 1990.

From 1990 to 1997 the constraint on profit was removed and a constraint on the average price chargeable to tariff users was introduced (the CPI-X Price Control Formula). Prices to contract users were not subject to regulatory constraint.

With price regulation, specific limitations on depreciation were removed. The rates used by the company during this period were:

[1] The limitations on dividends and depreciation actually applied to the total activity of the Australian Gas Light Company.

Mains	2%
Services	7.7%
Meters	6.6%
Vehicles	20%

1.3.3.2 Previous Tariffs

The per annum movement in average prices over these periods is set out in the table below:

Regulatory Period	Tariff Increases (%)	Contract Increases (%)
1977 – 1986	2	12
1987 – 1990	4	8
1990 – 1997	2	2

1.3.3.3 Previous Depreciation Treatment

The depreciation of the assets was:

1976 – 1986	3% of book value (declining balance; equivalent to 2% straight line)
1986 – 1990	For assets acquired before 1986 – 3% of book value. For assets acquired after 1986 – see list in 'Regulatory System' above.
1990 – 1997	See list in 'Regulatory System' above

The allowance for depreciation for assets acquired after 1986 is generally consistent with economic life. The allowance for depreciation for assets acquired before 1986 is generally consistent with economic life for mains and services, but is inadequate for meters, plant, equipment, motor vehicles, office furniture etc.

1.3.3.4 Previous Returns

The returns available under the regulatory systems (1977–1990), and actual returns achieved (1991-1996) are compared with benchmark returns calculated using the Capital Asset Pricing Model (benchmark returns are shaded):

Regulatory Period	Regulatory Constraint – on Equity		Regulatory Constraints – on Tariff Price	
	Cost of equity % Without (With) imputation	Allowable return on equity % LTBR + 3 (LTBR+2)	Cost of capital % (WACC) Without (With) imputation	Returns achieved % (EBIT/FE)
1977 – 86				
1977	16.9	(12.4)		
1978	16.0	(11.5)		
1979	15.3	(10.8)		
1980	16.5	(12.0)		
1981	19.0	15.6		
1982	21.4	18.0		
1983	19.4	16.0		
1984	19.9	16.5		
1985	19.9	16.5		
1986	21.2	17.9		
Average	18.6	14.7		
1987 – 1990				
1987	19.8 (16.0)	16.4		
1988	19.3 (12.7)	15.9		
1989	19.4 (14.4)	16.0		
1990	19.4 (14.3)	15.9		
Average	19.5 (14.4)	16.1		
1991 – 1996[2]				
1991			21.8 (18.4)	12.3
1992			18.5 (15.6)	11.6
1993			17.8 (15.0)	12.8
1994			14.3 (12.4)	12.7
1995			18.2 (15.9)	13.5
1996			16.5 (14.1)	14.8
Average			17.9 (15.2)	13.0

From 1977 to 1986 AGLGN was allowed to earn returns which were on average 3.9% below the cost of capital. If dividend imputation was taken up to the extent of 50% following its introduction in 1986, then AGLGN would have during the period 1987 to 1990 been allowed to recover on average 1.7% above the cost of capital. If dividend imputation was not taken up immediately AGLGN was allowed to earn 3.4% below the cost of capital. During the period 1991 to 1996 AGLGN earned 2.2% below the cost of capital (assuming dividend imputation), and 4.9% below (if dividend imputation is not assumed)

1.3.3.5 Summary

As a consequence of the regulatory constraint on depreciation of assets acquired before 1986 it appears that AGLGN has recovered, by way of depreciation, less than would have been the case had depreciation been calculated on economic life.

[2] Returns achieved with Goldline on balance sheet.

Over the period 1977 to 1996 AGLGN was not given the opportunity, except perhaps for the four year period from 1987 to 1990, to recover the cost of capital. It is unlikely that the cost of capital was recovered in the years before 1977 as profit restrictions similar to those in 1977 applied.

1.3.4 The reasonable expectations of Interested Parties under the regulatory regime that applied to the Pipeline prior to commencement of the Code (Code section 8.8 (v))

As outlined in Section 1.3.3.2 above, contract prices have generally increased more than tariff prices. However, in the regulatory period just prior to the commencement of the Code, prices to contract and tariff customers increased by the same percentage amount. It might be reasonable to assume that users expected the trends of the past to continue into the future, but it is not clear if their reference point would be the long term past or short term past, or some combination of both.

1.3.5 The comparability with the cost structure of new Pipelines that may compete with the Pipeline in question (Code section 8.8(vii))

A DORC based valuation should result in a cost structure which is similar to, though lower than, the cost structure of potential bypass pipelines or networks.

1.3.6 Past user contributions (Code section 8.8 (viii))

AGLGN was required by regulatory bodies to treat past user contributions as revenue. Given regulatory constraints on dividends and profit in the period 1976 to 1990 such contributions allowed increases in prices paid by tariff consumers to be postponed. The Tribunal recognised this in its 1997 Determination:

> *"In practice, it appears that previous regulators effectively passed the benefits of capital contributions on to tariff market customers"* (page71).

The Tribunal did not take capital contributions into account in determining reference tariffs, and pointed out that the Code would not permit it to do so. Furthermore, it pointed out that it would not be appropriate for it to reflect past user contributions in the determination of the capital base.

1.3.7 Other well recognised asset valuation methodologies (Code section 8.6(iii) Line in the sand/Optimised Deprival Value (LIS/ODV).

As mentioned earlier, the Tribunal determined the 1996 ICB as the NPV of a sustainable revenue stream, and indicated it would take a similar approach in this redetermination. This approach – now called the "line-in-the-sand" approach (LIS/ODV) – has been further developed by the Tribunal and is outlined in its 1998 Draft Decision on GSN (Draft Decision Section 5.2.3).

In establishing the LIS/ODV value for GSN, the Tribunal made the following assumptions:

- current revenue stream (unit prices) from volume customers is to be maintained in real terms. Revenue from contract customers is to be reduced to a level reflecting a return on DORC only. This revenue reduction will be phased in over the five years to 2002/03.
- over the first five years, GSN's projection of refurbishment/replacement capital expenditure is to be applied. An annual refurbishment expenditure of $0.46m is assumed from 2002/03.
- over the first five years, demand for volume (tariff) customers is assumed to grow by 2% per annum. Thereafter tariff growth is assumed to be zero. Growth is assumed to be zero for the whole period for contract customers.

The analysis is detailed in Attachment 4 to the Draft Decision.

AGLGN has conducted this same form of analysis to establish its LIS/ODV value at 1 July, 1996. The assumptions made for this valuation include:

- For 1996/97 and 1997/98 – actual results (volume sales, costs, capital expenditure);
- For 1998/99 – budget;
- Assumptions regarding the future:
  - operating costs maintained in real terms from 1998/99.
  - the unit price to tariff (volume) customers is to be maintained in real terms from 1998/99. Revenue from contract customers is to be reduced to a level reflecting a return on DORC only. This revenue reduction will be phased in over the three years to 2001/02. (The Tribunal proposed five years for GSN. The three years for AGLGN was chosen to reflect that price reductions to contract customers served by AGLGN commenced in 1997/98).
  - Past patterns of growth for Tariff users is projected into the future.
  - No growth in contract demand beyond 1998/99
  - Capital for 1998/99 and thereafter derived from assumptions on household connections, and replacement costs.

For GSN the Tribunal employed a discount rate of 7.5%. Discount rates applied are:

1996/97	11.2%
1997/98	12.0%
1998/99	8.0%
1999/00	8.0%

The move through 11.2%, 12.0% etc to the suggested 8% is to reflect movements in the cost of capital over the period.

It is usual in valuation assessments to include a residual value as a cash inflow in the last year of the analysis to reflect the ongoing service of the assets beyond that time. Without this the business will be undervalued. Commonly the residual value is determined as earnings before interest, tax and depreciation divided by the discount rate.

On this analysis the NPV component is $2099m, equivalent to 115% of DORC (expressed in terms of funds employed). Therefore, the initial capital base on this approach would be $1831m, equivalent to 100% of DORC (expressed in terms of funds employed).

1.3.8 Benchmark Valuations

In its 1997 Determination, the Tribunal indicated that it would

> *"cross check the asset valuation based on the sustainable revenue stream against other benchmarks of asset values" (page 67).*

1.3.8.1 Benchmarks of ICB against DORC

Since that time the ACCC and the ORG have reached decisions in relation to TPA, Multinet, Westar, and Stratus, and the Tribunal has reached a draft decision in relation to GSN. Most of the Victorian gas asset DORCs were adjusted for policy reasons. These valuations are compared with the relevant DORC valuations in the following table (including with respect to adjusted and unadjusted DORCs)[3]. These are shown below:

	TPA ACCC	**Multinet ORG**	**Westar ORG**	**Stratus ORG**	**GSN IPART**
ICB	363.7	740.2	631.7	580.0	28.3
Adjusted DORC	363.7	740.2	631.7	580.0	
ICB/DORC	100%	100%	100%	100%	
Unadjusted DORC	373.9	740.2	686.2	603.2	32.7
ICB/DORC	97.3%	100%	92.1%	96.2%	86.5%

1.3.8.2 Past returns and depreciation

Section 8.6(i) of the NSW Code requires that, in determining the Initial Capital Base, regard shall be had to :

> *the value that would result from taking the actual cost of the Relevant Pipeline and subtracting the accumulated depreciation for the Pipeline that has been charged to Users (or is thought to have been charged to Users) prior to the commencement of the Code.*

Section 8.8(ii) of the NSW Code requires that, in determining the Initial Capital Base, regard shall be had to:

> *the basis on which Tariffs have been (or appear to have been) set in the past, the depreciation of the Relevant Pipeline, and the historical returns to the Service Provider from the Relevant Pipeline.*

[3] See p6 of ORG Final Approval 17 December 1998.

Section 8.8(ii) therefore brings in the matter of recovery of capital as well as return on capital to the determination of the Initial Capital Base. If regard is to be given to this section then a proper reading of 8.6(i) – 'accumulated depreciation for the Pipeline that has been charged to Users (or is thought to have been charged to Users)' – should be that 'accumulated depreciation' is the cumulative movement in the value of the pipeline, where the valuation of the pipeline is adjusted annually for the difference between the net revenue from the pipeline (less operating costs) and the capital costs of holding the pipeline asset.

Section 1.3.3.4 of this AAI presents evidence that AGLGN has under-recovered in depreciation and returns (on a DAC basis) over the life of the NSW networks.

On page 49 of its Draft Decision on GSN, the Tribunal notes that:

> *"Based on information available, it appears that tariffs set by WWCC generated good returns by commercial standards, including recovery of capital through the allowance for $7m accumulated depreciation in the cost base. There is no suggestion of under-recovery of costs (on a DAC basis), which would require remedy through increases in average prices".*

The Tribunal proposed an ICB for GSN that is equivalent to 86.5% of DORC. In light of this, and having regard for the historical returns to and of capital for GSN and AGLGN, AGLGN believes the ICB should be a percentage of DORC that is greater than 86.5%.

1.3.8.3 Other well recognised methodologies

Section 8.6(iii) of the NSW Code requires that, in determining the Initial Capital Base, regard shall be had to :

> *"the value that would result from the application of other well recognised asset valuation methodologies"*

The Line in the Sand/Optimised Deprival Value (LIS/ODV) method is well recognised and has been employed by the Tribunal with respect to AGLGN (1997 Access Undertaking) and more recently in its Draft Decision with respect to GSN.

The Tribunal's LIS/ODV with respect to GSN supported a number equivalent to about 86.5% of DORC. The LIS/ODV analysis for AGLGN (see 1.3.7) supports an asset valuation equivalent to 100% DORC.

The Tribunal proposed an ICB for GSN that is equivalent to 86.5% of DORC. In light of this and having regard for the value that would result from the application of the LIS/ODV method with respect to GSN and AGLGN, AGLGN believes the ICB should be a percentage of DORC that is greater than 86.5%.

SECTION TWO

OPERATING COSTS
DEPRECIATION
CAPITAL EXPENDITURE
RATE OF RETURN

2.1. Operating Costs

Operating costs (net of miscellaneous income) are shown in the table below.

	1997	1998
Operating cost		
- Base costs	130.8	124.9
- Contestability costs	0.0	0.0
- Total costs	130.8	124.0
- Base cost per customer (1999 $'s)	196.1	178.8

For a detailed break up of operating costs refer to Attachment 1. Comparative KPIs are presented in Section 8.3.

2.2. Depreciation

2.2.1 Economic Life

There has been a convergence of opinion regarding the economic life of assets since AGLGN's initial access arrangement (the 1997 Access Undertaking) was approved in 1997. AGLGN has revised the lives of some of the assets to more closely align with those proposed for Victorian gas assets[4], and those proposed by Great Southern Networks (GSN). These are shown in the table below:

[4] See ORG Final Decision October 1998; p 60 and 91

Asset	Greenwood Challoner/AGL 1997 Access Arrangement	Sinclair Knight Merz/Victorian gas assets	Great Southern Energy Networks	AGL Access Arrangement 1999
Mains:				
Cast iron	50	50-120	100	50
Steel		30-120	80	80
Polyethylene/ Nylon		60	50	50
Inlet services	30	As for mains	50	50
Meters	15	25	15	15
District Regulators	-	50	40	50
City Gate	-	50	50	50
SCADA system	-	5-7	20	5-10
Plant & Equipment	10-20	-	5	5-20

2.2.2 Depreciation/Accumulated Depreciation

Depreciation expense is provided for in the NSW Code in sections 8.11 to 8.13. Depreciation has been calculated using a Current Cost Accounting (CCA) approach. This represents a change from the 1997 Access Undertaking which used the Historical Cost Approach. The CCA approach has been adopted to move in line with the approach taken by the ORG and the ACCC for the Victorian gas assets. GSN has also proposed CCA for its gas assets. Under the CCA approach assets are revalued each year in line with inflation and depreciation is calculated on a straight line basis on the revalued capital base.

AGLGN has adopted the formulae approved by the ORG and the ACCC in relation to the Victorian gas assets to determine the CCA depreciation:

(a) Depreciation = accounting charge * $(1 + CPI)^n$
(b) Return = written down value (WDV) of assets * real WACC
(c) WDV of assets = Accounting WDV of assets brought forward * $(1 + CPI)^n$ + 50% of current year capex * (1 + CPI)

The Replacement Cost (of assets) as at 1 July 1999 is $3076m. Optimised Replacement Cost is $3018m. Depreciated Optimised Replacement Cost is $2176m. Asset stranding (replacement cost less optimised replacement cost) is $58m. Accumulated depreciation is $842m.

2.3. Capital Expenditure

2.3.1 Capital Expenditure (New Facilities Investment)

Capital Expenditure (or New Facilities Investment) to be included in the Capital Base during the Access Arrangement Period is required to meet the principles contained in clause 8.15 to 8.21 of the NSW Code.

Capital Commitments – It is not AGLGN's practice to commit significant amounts of capital expenditure in advance. The only major commitment as at December 1998 is the reticulation of towns in the Central West of New South Wales which have forecast expenditure of $25m.

Costs associated with extensions for specific project areas already approved (eg Blue Mountains, Central West) have been included using latest forecasts.

The assumed growth in gas demand, derived from customer growth, has been used to determine the scope and cost of system reinforcement necessary for the extended network.

Contestability – Contestability is a new category of capital expenditure for the enhancement of Information Systems capability to provide for contestability for tariff customers.

2.4. Rate of Return

AGLGN has used a weighted average cost of capital (WACC) approach as a guide to determining a rate of return. A similar approach has been used in recent regulatory decisions relating to gas industry infrastructure.

In September 1998 the Draft Decision by the Tribunal concerning GSN found that a reasonable real pre-tax WACC for gas industry infrastructure lay in the range 6.2% to 8.6%[5]. In its Draft Decision the Tribunal decided on a WACC of 7.5%.

In October 1998 two regulatory decisions by the ORG and ACCC found that 7.75% was a reasonable real pre-tax WACC for gas industry infrastructure in Victoria.

The Victorian decisions regarding rate of return were reached following significant public debate on the WACC approach and the nature and value of the variables used in calculating the relevant WACC. AGLGN believes that any future consideration of factors relevant to the WACC approach is unlikely to substantially deviate from the consideration undertaken in the Victorian decision process.

Given that it is only three months since the final decisions relating to Victoria, AGLGN believe that the Victorian outcomes are benchmarks from which a WACC for New South Wales gas infrastructure can be reasonably determined.

[5] IPART Draft Decision on the Access Arrangement submitted by Great Southern Energy Gas Networks Pty Limited; p154 ; Conversion 3

In using the Victorian outcomes as a benchmark it should be noted that the risks in the NSW market are greater due to the lower level of maturity in the NSW market, the greater concentration of usage in the large user end of the market (with several of the largest users accounting for a substantial proportion of total usage) and the significantly higher city gate price for gas in NSW resulting in higher delivered prices to consumers and consequent greater exposure to competing energy options.

The regulatory decisions outlined above were substantially decided before the full impact of the Longford gas plant incident. Given the timing of this incident vis a vis the release of the decisions, it is unlikely that the full impact of risks of this nature, which were not contemplated before the incident, were taken into account in the decisions.

In using a WACC approach the WACC calculations should be used as a guide to identify a range in which a reasonable rate of return may be expected to lie. The selection of a final WACC then relies on consideration of other relevant factors and the exercise of judgment.

Determination of precise values of many of the relevant parameters to be used in the various WACC calculations is problematic. The ranges of major variables AGLGN has considered are outlined in the table below. Consideration of these parameters may establish a range within which a reasonable WACC could be expected to lie.

Parameter	Value
Inflation	2% -3%
Corporate Tax Rate	36%
Dividend Imputation Utilisation Rate	30% - 50%
Nominal 10 Year Bond Rate	4.80% - 5.20%
Debt Margin	1.00% - 1.45%
2010 CPI Linked Bond Rate	3.20% - 3.50%
Market Risk Premium	6.0% - 7.0 %
Asset Beta	0.5 – 0.65

AGLGN has based its WACC calculations on a 60:40 debt to equity ratio. This, combined with the parameters outlined in the table above, may be expected to produce a nominal cost of debt in a range 6 % to 7.25% and a nominal cost of equity in a range 12% to 16%.

In deriving this nominal cost of equity, asymmetric and self-insured risks were considered. These risks are not readily accounted for in the WACC-CAPM approach. Nevertheless, these risks are real and have been incorporated into the upper ranges of the nominal cost of equity ranges above. AGLGN believes any rate of return consideration should take asymmetric and self-insured risks into account.

Using WACC calculations as a guide, combined with commercial judgment and relevant benchmark rates of return, AGLGN has adopted a cost of capital of 8% pre-tax real as being consistent with the provisions of the NSW Code.

PART TWO: ACCESS AND PRICING PRINCIPLES

SECTION THREE – COST ALLOCATIONS

3.1. Cost Allocation Approach – Contract Market

This section describes how the contract segment revenue stream (after exclusion of the revenue estimated to be derived from overrun charges) (Allocable Component) is allocated to determine contract Reference Tariffs. The elements of the Reference Tariffs are:

(a) Capacity Charges – expressed as an annual unit charge for capacity reservation ($/GJ of contract MDQ per annum) or Throughput Charges – expressed as a unit charge for the quantity delivered ($/GJ of throughput).

(b) Meter Reading Charges – expressed as $ per annum per device. Meter Reading charges are dependent on the metering devices at the customer delivery point.

(c) Transitional Charges – expressed in $/GJ of contract MDQ per annum.

The derivation of these elements are described in sections 3.2, 3.3, 3.4 and 3.5.

3.2. Derivation of Capacity Charges

The process of deriving capacity charges involves the following principal steps:

- Determine the Allocable Component of the contract segment revenue stream for 2003 and 2004, which are Years 4 and 5 of the Access Arrangement period..
- Allocate the Allocable Component of the sustainable revenue stream to asset groups .
- Determine Trunk Charges for those regions served by the Coastal Trunk (Wilton – Newcastle) and Southern Trunk (Wilton – Wollongong).
- Determine Local Network Charges for the regions of Sydney, Newcastle (including Central Coast) and Wollongong.
- Determine Pressure Reduction Charges for Country TRSs (Trunk Reduction Stations) and Local Network Charges for Country NSW.
- Identify decrement customers and capped customers, and, if there are any, roll back their decrement and recalculate.
- Determine the Annual Unit Charge for Capacity for each customer.
- Determine the Transitional Charges for Years 1 to 3 of the Access Arrangement period.

3.2.1 Allocation of the Sustainable Revenue Components to Asset Groups

The Allocable Component is split between the various asset groups by their ORC relativities. The asset groups to which the revenue is allocated are:

Asset Group	Description
Coastal Trunk	The trunk main between Wilton and Newcastle which supplies Sydney, the Central Coast and Newcastle.
Southern Trunk	The trunk main between Wilton and Mt Keira which supplies Wollongong.
Country TRSs	Local country TRSs.
Sydney Local Network	Includes primary, secondary & MP/LP mains, primary valves, TRS/PRS/SRSs, meters and services in the Sydney Region.
Newcastle Local Network	Includes secondary & MP/LP mains, TRS/SRSs, meters and services in the Central Coast & Newcastle regions.
Wollongong Local Network	Includes primary, secondary & MP/LP mains, TRS/PRS/SRSs, meters and services in the Wollongong region.
Country Local Network	Includes secondary & MP/LP mains, SRSs, meters and services in country NSW.
Meter Reading Assets	Includes meter reading devices in the Sydney, Newcastle, Wollongong & country regions.

The operating costs attributed to the contract segment are allocated to the regions of Sydney, Newcastle, Wollongong and Country based on the proportions of the total (ie contract plus tariff) operating costs attributed to each region on an activity basis. The operating costs were allocated to the Asset Groups within each region by the type of operating activity, where activities related to specific assets, and then by ORC (Optimised Replacement Costs) of the assets.

The contract stand-alone ORC and the allocation of the contract sustainable revenue to the various asset groups is given in the table below. Allocation of the contract revenue to the various asset groups applies only in Year 4 and 5. A transitional component was used to allocate the revenue stream in Years 1 – 3.

To determine the ORC of the contract stand-alone share of both the trunk main and the local networks, the mains were redesigned to supply the contract market only. The optimised contract stand-alone network model was determined by eliminating any branches not supplying contract customers, and by downsizing mains to eliminate excess capacity (see Attachment 6). The replacement cost of the design was calculated using JP Kenny[6] unit costs (adjusted to 1999 values).

[6]Natural Gas Distribution Networks of New South Wales Asset Valuation 1st July 1996, JP Kenny, June 1996.

Asset Group	Optimised Contract Stand-Alone Replacement Cost ($,000)
Coastal Trunk Southern Trunk Country TRSs	136,722 5,460 2,252
Sydney Local Network	201,843
Newcastle Local Network	32,666
Wollongong Local Network	14,334
Country Local Network	18,268
Meter Reading Devices	18,708
Total	430,252 [7]

3.2.2 Determination of Trunk Charges

The contract revenue of the Coastal Trunk assets is allocated to the Sydney and Newcastle regions as follows:

3.2.2.1 Sydney

$$\text{Asset Revenue}_{\text{Trunk, Sydney}} = \text{Asset Revenue}_{\text{Trunk, Coastal}} \times \frac{\text{ORC}_{\text{Sydney Trunk}}}{\text{ORC}_{\text{Coastal Trunk}}} \times \frac{\sum_i \text{MDQ}_{\text{i(Sydney Trunk)}}}{\sum_i \text{MDQ}_{\text{i(Sydney Trunk)}} + \sum_i \text{MDQ}_{\text{i(Newcastle Trunk)}}}$$

3.2.2.2 Newcastle (including Central Coast)

$$\text{Asset Revenue}_{\text{Trunk, Newcastle}} = \text{Asset Revenue}_{\text{Trunk, Coastal}} \times \left(\frac{\text{ORC}_{\text{Newcastle Trunk}}}{\text{ORC}_{\text{Coastal Trunk}}} + \frac{\text{ORC}_{\text{Sydney Trunk}}}{\text{ORC}_{\text{Coastal Trunk}}} \times \frac{\sum_i \text{MDQ}_{\text{i(Newcastle Trunk)}}}{\sum_i \text{MDQ}_{\text{i(Sydney Trunk)}} + \sum_i \text{MDQ}_{\text{i(Newcastle Trunk)}}}\right)$$

where:

$\text{Asset Revenue}_{\text{Trunk}}$	= Asset Revenue allocated to the trunk in a region ($)
ORC	= Optimised Replacement Cost ($).
MDQ_i	= The MDQ reservation for contract customer i (GJ).

[7] Excludes an additional $70,000 of impending asset investments for 1998/1999.

Note: Customers in Newcastle have an asset share of the Sydney Trunk (allocated by total MDQs in the regions) because gas to Newcastle is transported through the Sydney trunk.

The Trunk Unit Charge for each region (Sydney, Newcastle and Wollongong) is calculated as follows:

$$\text{Trunk Unit Charge}_{\text{Region}}\ (\$/\text{GJ MDQ}) = \frac{\text{Revenue}_{\text{Trunk, Region}}}{\sum_i \text{MDQ}_{\text{i, Region}}}$$

where:

$\text{Revenue}_{\text{Trunk, Region}}$ = Total revenue allocation to the trunk for the region which comprises the Trunk Asset Revenue and Operating Cost components($).

$\text{MDQ}_{\text{i, Region}}$ = MDQ reservation for contract customer i in the region (GJ).

3.2.3 Determine Local Network Charges for Individual Postcodes for Coastal Zones

Local Network Charges are calculated to postcode locations within the regions of Sydney, Newcastle and Wollongong. The optimised contract stand-alone network was modelled by defining a central network node ("postcode node") within each postcode (refer to Attachment 6, Figure 5). At these nodes, the loads of contract customers within a postcode were aggregated. The share of assets by flow to each postcode node was calculated to determine a local network charge.

The Local Network Unit Charge for each postcode is calculated from the following formula:

$$\text{Local Network Unit Charge for Postcode i}\ (\$/\text{GJ MDQ}) = \frac{\text{Alloc}_{\text{LN}} \times (\text{SAV}_{\text{Mains(i)}} + \text{SAV}_{\text{RS(i)}} + \text{SAV}_{\text{Comp(i)}})}{\sum \text{MDQ}_{\text{i}}}$$

where:

MDQ_{i} = Contract MDQ reservation for postcode i.

and,

$$\text{i)}\ \text{Alloc}_{\text{LN}} = \frac{\text{Revenue}_{\text{LN}}}{\text{AV}_{\text{Mains}} + \text{AV}_{\text{RS}} + \text{AV}_{\text{Comps}}}$$

in which:

$\text{Revenue}_{\text{LN}}$ = Revenue allocated to the Local Network comprising Asset Revenue and Operating Costs components ($)

AV_{Mains} = Optimised Replacement Cost of feeder mains to postcode nodes in the optimised contract stand-alone Local Network ($)

AV_{RS} = Optimised Replacement Cost of TRS/PRS in the optimised contract stand-alone Local Network ($)

AV_{Comps} = Optimised Replacement Cost of the other local network components, that is, network branches, regulator stations, meters and services in optimised contract stand-alone Local Network ($)

ii)

$$SAV_{Mains(i)} = \text{Postcode i's Share of Local Network Mains Asset Value (\$)}$$

$$= \sum_j \left(\frac{Q_{ij}}{Q_{Tj}} \times L_j \times C_{Pj}\right)$$

in which:

Q_{ij} = Portion of postcode i's contract MDQ which flows through pipe j.
Q_{Tj} = Total contract MDQ which flows through pipe j.
L_j = Length of pipe j (metres).
C_{pj} = Unit cost of pipe j (function of pipe diameter) ($/m).

Note: The element Qij for a particular postcode is determined through network analysis of the optimised contract stand-alone design. In this analysis, the flow through each network pipe segment to supply each postcode is traced from the source.

iii)

$$SAV_{RS(i)} = \text{Postcode i's Share of TRS/PRS Asset Value (\$)}$$

$$= \sum_k \left(\frac{F_{ik}}{F_{Tk}} \times C_{Tk}\right)$$

in which:

F_{ik} = Portion of postcode i's contract MDQ which flows through TRS/PRS k.
F_{Tk} = Total contract MDQ which flows through TRS/PRS k.
C_{Tk} = Contract Market's share of TRS/PRS k replacement cost ($).

iv)

$$SAV_{Comps(i)} = \text{Postcode i's Share of Other Local Network Components Asset Value (\$)}$$

$$= \sum_l AV_{il}$$

in which:

AV_{il} = Replacement Cost of Component *l* (network branches, regulators, meters and services) in postcode i ($) .

3.2.4 Determination of Transportation Charges for Country NSW

3.2.4.1 Pressure Reduction Charges Relating to Country TRSs

Pressure Reduction Charges for the country networks are analogous to the Trunk Charges for the Sydney, Newcastle and Wollongong regions. However, customer MDQ reservations are broken into three blocks where each block is given a scaled transportation unit cost. Customers pay a premium unit charge for the first block of MDQ capacity reservation and a reduced unit cost for subsequent blocks of gas they use.

The Pressure Reduction Unit Charge ($/GJ. MDQ) for the Country NSW is calculated as:

$$\text{Pressure Reduction Unit Charge} = \frac{\text{Revenue}_{TRS\_C}}{\sum_i (f_i \times MDQ_{i,\ Block1} + f_2 \times MDQ_{i,\ Block2} + f_3 \times MDQ_{i,\ Block3})}$$

Revenue_{TRS_C} = Revenue allocation to the country TRSs comprising Asset Revenue and Operating Costs components ($).
MDQ_i = The MDQ reservation for contract customer i in the country region (GJ).
f1, f2, f3 = scaling factors for MDQ blocks 1, 2 and 3

3.2.4.2 Local Network Charges for Country Customers

Local Network Charges for contract customers in the Country region are based on their direct distance from the TRS which supplies the Local Network and their booked MDQ reservation. The three MDQ blocks applied in the Pressure Reduction Charge also apply to the Local Network Charge.

The Local Network Unit Charge ($/GJ.MDQ/km) is calculated as follows:

$$\text{Local Network Unit Charge} = \frac{\text{Revenue}_{LN\_country}}{\sum_i (\text{Dist}_i \times (f_1 \times MDQ_{i,\ block1} + f_2 \times MDQ_{i,\ block2} + f_3 \times MDQ_{i,\ block3}))}$$

where

$\text{Revenue}_{LN\_country}$ = Revenue allocated to the Local Network of the Country Region comprising Asset Revenue and Operating Costs components ($)

Dist_I = Direct distance (km) from the TRS supplying the local network, rounded to the nearest 0.5 km

f_1, f_2, f_3 = scaling factors for MDQ blocks 1, 2 and 3

3.2.5 Roll in of Decrement and Capped Customers

Decrement customers are customers whose revenue is to be kept at its current level, subject to annual CPI increases; capped customers are customers whose prices are capped so as not to exceed reasonable relativity with Tariff Customers. The shortfall between the expected revenue from these customers and the revenue that would be achieved if they were to pay the Reference Tariff is borne by the remaining customers.

Decrement and capped customers will firstly cover their Meter Reading charge, then their Trunk charge and, in most cases, part of their Local Network charge. The shortfalls are calculated on a regional basis so that, for example, a shortfall in the Sydney Local Network will not affect Newcastle's Local Network price.

The revenue allocation process is repeated for the remaining reference price customers with the expected contributions of decrement and capped customers to the revenue eliminated from the calculations. The whole process is repeated until no new decrement or capped customers are identified.

3.2.6 Annual Unit Charge for Capacity

The Annual Unit Charge for Capacity for a particular end user on the Trunk Section is the sum of the appropriate Trunk Unit Charge and Local Network Unit Charge. If the Delivery Point is on the country sub-network, then the Annual Unit Charge for Capacity is the sum of the Pressure Reduction Unit Charge and Local Network Unit Charge.

3.3. Derivation of Throughput Charges

The Allocable Component of Contract revenue has been allocated to Users on the assumption that all users will choose the Capacity Reservation Service, because this represents the most cost effective service where a user manages their MDQ. The Throughput Service has been included for users that have uncertain or variable circumstances and would prefer the predictability of throughput based charging and the MDQ management service implied by it.

It is assumed that revenues attracted for the small proportion of the market that would choose this service will offset the revenues that would have been earned under one of the capacity based services. Any potential for earning higher than expected revenue under this service is fully offset by the degree of risk associated with this service to AGLGN when compared with the Capacity Reservation Service.

The price for the Throughput Service has been derived as an extension of the Tariff Service for a 20 TJ pa customer and escalated at 2.2%pa (ie 80% of assumed CPI of 2.5%).

No Transitional Charge is considered appropriate for this service.

3.4. Derivation of Meter Reading Charges

Meter Reading charges are based on the number of metering devices at the delivery point of the contract customers. The same unit charge applies to all regions in NSW. Meter Reading charges are calculated as follows:

$$\text{Meter Reading Unit Charge (\$/unit)} = \frac{\text{Revenue}_{\text{meter}}}{\text{Number of Metering Devices}}$$

where

Revenue_{meter} = Revenue allocated to meter reading comprising Asset Revenue and Operating Costs components ($)

3.5. Derivation of Transitional Charges

The NSW Code (Clause 9.1) provides for a Transitional Charge to apply while cross-subsidies are removed from the charges applicable to certain groups of customers.

The difference between revenue for the year 2002/03 and the sustainable revenue stream for a particular year has been determined to be a Transitional Component and is recovered from Users of the Reference Price Services by way of a Transitional Charge.

Transitional Charges apply for Years 1, 2 and 3 of the Access Arrangement period. The Transition Charge for a particular Delivery Point for a particular year (expressed as $/GJ of MDQ per annum) is determined by the formula set out in Section 3 of the Access Arrangement.

Put simply, if the Transitional Component for the market as a whole for a year is a fraction of "F" of the amount of cross-subsidy as it was prior to the commencement of the Access Arrangement, then the amount payable in Transitional Charges by a particular Delivery Point in that year will be that fraction ("F") of the Delivery Point's "contribution" to the prior cross-subsidy.

3.6. Tariff Market Pricing Structure

Currently, there are up to four separate tariffs applicable to each region (General Rate, Economy Rate, Economy Plus Rate and Industrial And Commercial Rate). A single tariff structure that is applicable across all of NSW has been derived to replace these tariffs. The structure has been designed to arrive at a price for customers which is related to usage level and does not require a knowledge of the customer appliance and usage profile which is now the role of gas suppliers.

Certain gas market issues were taken into consideration in developing the block structure. These were:

- Maintenance of competitiveness with substitute fuels
- Minimising price movements of individual market segments
- Maintaining appropriate relativities between Tariff and Contract prices.

3.7. Derivation of Tariff Charges

The process of deriving tariff charges involves the following steps:

(i) Determining the overall revenue earned from tariff market customers in 1997/98 (Target Tariff Revenue).

(ii) Design a tariff block structure that maintains competitiveness with substitute fuels and minimises price movements to individual market segments and achieves appropriate relativity between Tariff and Contract prices.

(iii) Using the AGLGN customer database which contains all load data from monthly and quarterly invoices for 1997/98 calculate the revenue that would have been generated had the proposed block structure been applied.

(iv) If Tariff Target Revenue is not achieved return to (ii) and adjust block structure.

(v) Escalate 1997/98 block structure to give 1999/2000 Tariff revenue.

3.8. Testing the Proposed Tariff Structures

Testing the proposed tariff structures involved replicating the 1997/98 billing process applying each proposed tariff block structure. This ensured that the seasonal nature of the Tariff segment usage was taken into account when calculating the revenue that would result from that block structure.

The 1997/98 year was used as a gas billing history was available for the full year.

3.9. Price Paths

Contract and tariff price paths are detailed in the Access Arrangement.

SECTION FOUR – FORM OF REGULATION / INCENTIVE STRUCTURES

4.1. Form of Regulation / Incentive Structure

The Access Arrangement adopts a price path approach to the determination of Reference Tariffs.

Price path is a well recognised form of incentive regulation.

PART THREE: SYSTEM CAPACITY AND VOLUME ASSUMPTIONS

SECTION FIVE – NETWORK DESCRIPTION AND ASSETS DATA

5.1. General

This section provides details of the AGLGN gas distribution network in NSW, including the summary and valuation of the network assets.

5.2. Description of AGLGN Gas Distribution Systems

AGLGN operates over 20,000 kilometres of gas distribution systems in NSW with over 750,000 customer connections to these systems. The systems provide access to natural gas in Sydney, Newcastle, Wollongong and regional country centres throughout New South Wales.

In total, AGLGN has networks in 75 Local Government Areas throughout NSW. The extent of these systems are portrayed on a series of Maps (Attachment 3).

Natural gas is delivered to AGLGN's various network systems by the Moomba-Sydney Pipeline, owned and operated by East Australian Pipeline Limited (EAPL) Pipeline or laterals from this Pipeline

The network systems in Sydney, Newcastle and Wollongong are supplied by the AGLGN Trunk Mains which interconnects with the EAPL Pipeline at Wilton.

The operating and metering pressures for the major elements of AGLGN's Network system are shown in the table below:

	Max. allowable operating pressure (kPa)	**Normal operating system min. pressure (kPa)**	**Emergency system min. (kPa)**	**Standard metering pressure (kPa)**	**Alternative metering pressures (kPa)**
Trunk	7000	3800	3800	n/a	-
Primary	3400	1750	1750	n/a	-
Secondary	1050	525	400	100	-
Medium	500	70	40	2.75	5, 35
	400	70	40	2.75	5, 35
	300	70	40	2.75	5, 35
	210	70	40	2.75	5, 35
Low	7	3.5	2.8	1.38	2.75
	2	1.5	1.4	1.38	-

The main elements of AGLGN's network system within NSW are described below.

5.2.1 Trunk Main

AGLGN's gas distribution systems in Sydney, Newcastle and Wollongong are supplied by a trunk main which commences at AGLGN's Trunk Receiving Station (TRS) at Wilton (south of Sydney). The Wilton TRS is supplied by the Moomba-Sydney Pipeline. The minimum contracted gas pressure for AGLGN at Wilton is 3800 kPa.

5.2.2 High Pressure Systems

AGLGN's Sydney primary main is fed from a TRS on the trunk main at Horsley Park. The Maximum Allowable Operating Pressure (MAOP) of the primary system is 3400 kPa, with a minimum allowable operating pressure of 1750 kPa. The primary main supplies gas to the Sydney secondary networks via a series of Primary Reduction Stations (PRSs). The MAOP of the secondary networks is 1050 kPa, with a minimum allowable pressure of 525 kPa.

The Wollongong secondary network is supplied from a primary system via a PRS, which in turn is supplied from the trunk system via a TRS. The Newcastle secondary networks are supplied directly from the trunk main via TRSs.

The secondary networks (or in some cases, the medium pressure networks) in country NSW are supplied directly from the EAPL Pipeline via local TRSs.

The secondary networks supply gas to the medium and low pressure distribution systems, as well as to many contract and tariff customers directly.

5.2.3 Medium and Low Pressure Distribution Systems

The medium and low pressure (MP & LP) distribution networks are fed from the secondary networks via SRSs (Secondary Regulator Sets). MP networks have an MAOP ranging from 210 kPa to 400 kPa.

LP networks have an MAOP of 7 kPa.

Nearly all tariff customers are supplied from the MP & LP networks.

5.2.4 Meters and Services

Each contract and tariff customer is supplied by a service and meter set.

All contract customer meters are electronically linked to AGLGN's Metretek database.

5.3. History of Network Development

AGLGN's original pipe network was established in 1837 to provide lighting in the streets of Sydney using manufactured, or towns, gas. In the early years, the distribution system consisted of underground cast iron pipes. Little consideration was given to corrosion protection of these pipes, and there was over a long period of time insufficient funds to properly maintain the distribution system. Consequently, the majority of cast iron mains fell into disrepair. However, leakage of gas from the system was contained as the town gas was quite wet and tended to seal the surrounding soil.

During the years of 1976 - 1990, AGLGN converted from town gas to natural gas. The natural gas was supplied to AGLGN by a consortium of South Australian Cooper Basin producers, and was transported to the AGLGN distribution networks via the Moomba-Sydney Pipeline.

The conversion to dry natural gas caused problems, as the corroded steel and cast iron pipes often leaked. This gas leakage prompted the Goldline project, in which nylon pipes are inserted into the cast iron pipes. This project is almost completed. All new MP & LP networks are installed using non-corrodible nylon or polyethylene pipe.

New networks are currently being developed in the Blue Mountains and in the Western Plains towns of Forbes, Parkes, Narromine, Wellington, and Dubbo. and are about to be started in Holbrook, Culcairn, Walla Walla and Henty on the South West Slopes.

5.4. Design

AGLGN uses the Stoner network analysis computer simulations to model its trunk, primary, secondary and MP & LP systems. The network models are constantly updated, ensuring a reliable basis when making day-to-day decisions.

5.5. Network Performance Validation

Each year, a network performance validation is conducted in accordance with AGLGN's Technical Policies[8]. The purpose of the validation is to identify the needs and opportunities to reinforce the system to ensure supply reliability, provide for growth in the most efficient manner, and enhance security of supply. In the validation process, the Stoner network models are verified against actual network performance data.

The Gas Network Design Criteria and Performance Validation for Supply Reliability and Growth are shown in Attachment 5.

5.6. Data

5.6.1 Network Assets

The distribution assets comprising the NSW network as at 1 December 1998 are given in the table below.

[8] *Gas Network Design Criteria and Performance Validation for Supply Reliability and Growth*, AGL Gas Companies Technical Policy Document, (to be released) 1998 .

5.6.1.1 Existing Network Assets

Asset	Length (km))/Number
Trunk Main	260
Primary Mains	106
Secondary Mains	1373
MP & LP Mains	19,091
Secondary Services	1,594
MP & LP Services	732,187
ALB Valves	8
TRSs	57
PRSs	12
Primary Valves	11
SRSs	402
Residential Meters	710,092
Other Meters	16,075

5.6.1.2 System Load Profiles

Gas issues in TJ for the period December 1997- November 1998 are detailed in the Table below:

	Sydney	Newcastle	Wollongong	Country	Total
Dec 1997	4,721	1,814	496	379	7,410
Jan 1998	4,353	1,723	443	361	6,880
Feb 1998	4,481	1,727	462	402	7,072
March 1998	5,431	1,556	560	467	8,014
April 1998	5,241	1,216	485	489	7,431
May 1998	6,062	1,909	699	726	9,396
June 1998	6,426	2,004	678	833	9,941
July 1998	7,121	1,863	716	937	10,637
Aug 1998	6,686	2,055	644	804	10,188
Sep 1998	5,606	1,973	543	651	8,772
Oct 1998	5,553	1,986	509	608	8,656
Nov 1998	5,198	1,952	441	492	8,084
Total	66,879	21,776	6676	7,147	102,478

The average and peak flowrates for the contract and tariff markets over the above mentioned period are:

	Sydney	Newcastle	Wollongong	Country
Average Daily Flow Rates (TJ)	183.2	59.7	18.3	19.6
Peak Day Flow Rates (TJ)	268.1	85.1	32.7	32.6

SECTION SIX – DESCRIPTION OF NETWORK CAPABILITIES

6.1. General

A combination of 27 TRSs (Trunk Receiving Stations) and 21 POTS (Packaged Off Take Stations) owned by AGLGN, supply the various local High Pressure (HP) distribution networks off the EAPL Pipeline. The Medium Pressure (MP) and Low Pressure (LP) parts of the Network are served via district regulators from the HP system or in some cases, directly from the POTS.

Those sections of the Network which are in Sydney, Newcastle and Wollongong are supplied by the AGLGN Trunk Main which interconnects with the EAPL Pipeline at Wilton**.**

Those sections of the Network which are in country NSW are supplied directly or by laterals from the EAPL Pipeline. All country trunk pipelines are owned and operated by EAPL, except for the Marsden-Dubbo pipeline (Central West Pipeline) which is owned and operated by AGL Pipelines (NSW) Pty Limited.

6.2. Extent of AGL Networks

This Access Arrangement applies to AGLGN networks situated in the Local Government Areas (LGAs) listed in the tables on the following pages. This Access Arrangement covers the LGAs listed and also other LGAs in which AGLGN may develop the network in the future.

TRUNK MAIN							NETWORK DESCRIPTION		LOCAL GOVERNMENT AREAS
	RECEIPT AND SUPPLY POINTS								
	TRS Location	Min. Receipt Pressure	Min. Delivery Pressure at Inlet to TRS/POTS	POTS Location	Min. Receipt Pressure	Min. Delivery Pressure at Inlet to TRS/POTS	High Pressure	Medium Pressure	
Moomba - Young (EAPL)				West Wyalong	1750	1750	T		Bland
Young – Lithgow (EAPL)	Cowra Blayney Orange Bathurst Oberon Lithgow	1750 1750 1750 1750 1750 1750	1750 1750 1750 1750 1750 1750	 Millthorpe Wallerawang	 1750 1750	 1750 1750	T T T T T T	T T T T T T T T	Cowra Blayney Orange Orange Bathurst Evans Oberon Greater Lithgow Greater Lithgow
	Young Cootamun dra Rockdale Yoogali (Griffith)	1750 1750 1750 1750	1750 1750 1750 1750	 Junee Coolamon Ganmain Narrandera Leeton Murrami	 1750 1750 1750 1750 1750 1750	 1750 1750 1750 1750 1750 1750	T T T T T T	T T T T T T T T T T T	Young Cootamundra Junee Coolamon Coolamon Narrandera Narrandera Leeton Narrandera Griffith
Young - Wilton (EAPL)	 Goulburn Marulan Mossvale Bowral	 1750 1750 1750 1750	 1750 1750 1750 1750	Boorowa Yass Sally's Corner Bargo	1750 1750 1750 1750	1750 1750 1750 1750	 T T T T T T T T	T T T T T T T T	Boorowa Yass Goulburn Mulwaree Wingecarribee Mittagong Wingecarribee Wingecarribee

TRUNK MAIN							NETWORK DESCRIPTION		LOCAL GOVERNMENT AREAS
	RECEIPT AND SUPPLY POINTS								
	TRS Location	Min. Receipt Pressure [1.]	Min. Delivery Pressure at Inlet to TRS/POTS	POTS Location	Min. Receipt Pressure [1.]	Min. Delivery Pressure at Inlet to TRS/POTS	High Pressure	Medium Pressure	
Wilton CTS		3800+	3800						
Wilton-Wollongong (AGL)	Wollongong	3800+	1750				T	T	Wollongong Shellharbour Kiama
Wilton-Horsley Park (AGL)	Appin Campbelltown West Hoxton	3800+ 3800+ 3800+	1750 1750 1750	Appin	3800	1750	T T T	T T T T	Wollondilly Sydney (see list)
Horsley Park-Plumpton (AGL)	Horsley Park	3800+	3500				T	T	Sydney (see list)
Plumpton-Kooragang Island (AGL)	Plumpton Windsor	3800+ 3800+	1750 1750	Maroota	3800	1750	T T	T T T	Sydney (see list)
	Gosford Wyong	3800+ 3800+	1750 1750	Warnervale	3800	1750	T T	T T T	Gosford Wyong
	Hexham Kooragang Island	3800+ 3800+	1750 1750	Morisset Minmi	3200 3200		T T	T T T T	Lake Macquarie Newcastle Maitland Cessnock Singleton Muswellbrook Port Stephens

1. If marked >+= then the Minimum Receipt Pressure may be subject to future increase to a maximum of 7, 000 kPa

TRUNK MAIN							NETWORK DESCRIPTION		LOCAL GOVERNMENT AREAS
	RECEIPT AND SUPPLY POINTS								
	TRS Location	Min. Receipt Pressure	Min. Delivery Pressure at Inlet to TRS/POTS	POTS Location	Min. Receipt Pressure	Min. Delivery Pressure at Inlet to TRS/POTS	High Pressure	Medium Pressure	
Marsden - Dubbo (AGLP)	Dubbo	1750	1750	 Forbes Parkes Narromine	 1750 1750 1750	 1750 1750 1750	T	T T T T	Dubbo Wellington Forbes Parkes Narromine
Wagga Wagga - Albury (EAPL)				Calcairn Henty (proposed) Walla Walla (proposed)	1750 1750 1750	1750 1750 1750		T T T T	Culcairn Holbrook Culcairn Culcairn

SECTION SEVEN – CUSTOMER INFORMATION

7.1. General

Estimated 1999 customer numbers and annual loads for the Sydney, Newcastle, Wollongong and Country regions are given in the tables below. The contract customer numbers include all customers with annual usage greater than 10 TJ PA.

Estimated 1999 Customer Numbers by Region

	Contract	**Tariff**
Sydney	374	576,173
Newcastle	52	78, 3381
Wollongong	18	43, 670
Country	52	52, 568
Total	496	751,750

Estimated 1998 - 1999 Annual Usage by Region

	Contract (TJ/A)	**Tariff (TJ/A)**
Sydney	45, 806	20,484
Newcastle	20,181	2, 214
Wollongong	5, 965	1, 140
Country	4, 165	2, 719
Total	76, 117	26, 557

PART FOUR: KEY PERFORMANCE INDICATORS

SECTION EIGHT – INFORMATION REGARDING KEY PERFORMANCE INDICATORS

8.1. Non-capital costs – performance

In recent years AGLGN has been re-engineering its processes to prepare for the new regulatory environment. This program was given added emphasis by the Tribunal's Final Determination which removed $60m of contract revenue and suggested that assets might be stranded if AGLGN did not improve the profitability of the tariff market.

In the two years ending 1997/98 this process achieved real improvements of 17.5% in operating cost per customer.

	1996	**1997**	**1998**
Operating cost			
- Nominal ($m)	135.7	130.8	122.1
- Real ($m)	140.8	135.4	125.2
Operating cost per cust			
- Nominal ($)	204	190	170
- Real ($)	211	197	174
Base Operating cost per cust.			
- Nominal ($)	204	190	170
- Real ($)	211	197	174
Operating cost per km			
- Nominal ($K)	6.9	6.5	5.9
- Real ($K)	7.2	6.7	6.0

Notes
- Retail costs removed from 1996 – 1997
- Goldline on balance sheet

This process was designed around three objectives:
- to cease carrying on those activities which do not add value to customers;
- to outsource those activities that do add value to our customers but could be done more efficiently by third parties; and
- to review and improve processes which will continue to be carried out internally

Some of the results of these reviews are summarised in the boxes below.

To cease carrying out activities which do not add value to customers.
The following activities have been discontinued:

- AGLGN formerly maintained significant warehousing capability and typically purchased and warehoused materials prior to issuing those materials to jobs. AGLGN now adopts a just-in-time approach where possible, and contractors are required to provide materials themselves. This change in work practice has resulted in the closure of the central warehouse (with annual operating cost savings in excess of $2m pa) together with the closure of several smaller stores and a reduction in inventories of over $10m and associated holding cost.

- With the exception of those areas where it was critical for it to maintain a skills base to service specialised equipment, AGLGN ceased performing the appliance service function which it formerly ran as a service to customers with an annual operating loss of $1m. This function is now carried out by the plumbing industry at no cost to AGLGN.

- With the change in nature of the AGLGN workforce it became no longer necessary for AGLGN to continue to train apprentices. AGLGN formerly employed in excess of 40 apprentices with an annual labour cost in excess of $1m.

- AGLGN has closed its subsidised staff canteens which formerly operated at both North Sydney and Mortlake with annual cost savings of approximately $0.2m.

- AGLGN ceased its subsidy to the AGL Employee Credit Union with annual savings of $0.1m

- AGLGN has withdrawn from appliance merchandising with the closure of Gas Showcases throughout both metropolitan and regional NSW. Both existing retail companies and franchisees are being encouraged to promote the sale of natural Gas appliances.

- The activities of the Australian Gas Cooking School have been rationalised.

Outsource activities which can be done more efficiently by others

The activities outsourced and the impact is as follows:

- AGLGN maintains a unit of field operatives to provide a suitable urgent response capability, maintain the key knowledge and skills necessary to run the network and audit the activities of various contractors. All work, other than that necessary to keep this unit fully occupied is now contracted out to benefit from the competitive market for these services.

- Meter reading is now performed by a number of contractors who tender for contracts at competitive rates. This is estimated to have generated annual savings of $3m.

- The AGLGN transport workshop has closed and all transport maintenance is carried out externally to take advantage of the competitive market. An associated benefit has been the release of buildings and facilities.

- The production of cheques has been outsourced to the banking system and suppliers have been encouraged to accept payments through Electronic Funds Transfer.

- The property maintenance department which formerly had annual labour costs in excess of $1m has been disbanded with the work either outsourced or avoided due to the reduction in the number of sites occupied.

- All printing and courier services are now outsourced to benefit from the competitive markets for these services.

Improve internal processes

- The legal entity and management structure of the former AGL Gas Companies has been simplified to avoid the need for separate management and support staff for each regional area.

- Concurrent with the rationalisation of management units the management structure within the remaining business units has been simplified reducing the levels of management from 7 to 5 and devolving greater responsibility to front line staff and lower levels of management.

- Prior to 1998 arrangements for the restoration of footpaths and roads following maintenance and construction work were ad hoc and varied greatly throughout the State depending upon the operating requirements of various local councils. AGLGN has now finalised negotiations with all local governments bodies so that AGLGN coordinates restoration works and arranges competitive pricing through a range of contractors. This is estimated to have annual savings of $1.5m.

- Human Resources processes have been completely revised resulting in considerable (yet difficult to quantify) cost savings as well as greater productivity and improved job satisfaction.

- The major programmed rehabilitation begun in 1988 (as Goldline) continues with annual capital expenditure of $8m to $10m. Ongoing reductions in maintenance workloads and UAG provide the savings to offset the cost of this program along with increased reliability of supply.

- The reduction in maintenance workload due to programmed rehabilitation, the rationalisation of regional management teams and the greater use of outsourcing has enabled AGLGN to reduce the number of sites it requires to service its operations and enabled the closure of management centres and works depots.

- The strategy for the management of contractors and subcontractors has been revised with tenders now let for the management of contract work within geographic areas for three year terms. This process has achieved a balance between competitive bidding processes to reduce costs and economies of scale associated with having the work performed by a small number of contractors of sufficient size.

- Business support systems (Finance, HR, Fixed Asset, Procurement) were replaced during 1998 with the a suite of SAP modules and work practices affected by these systems have been updated accordingly.

- Work practices are subject to continuous revision to reduce costs and improve service deliverability..

The comprehensiveness of the actions and review, and their implementation, can be gauged by the fall in employee numbers. The total number of employees of the AGLGN have fallen from 1823 in June 1995 to 1193 in June 1997. Since the ringfencing of AGLGN, numbers employed by AGLGN have fallen from 648 in August 1997 to 587 in December 1998. While the reduction in employee numbers does not have a one to one correlation with cost savings, it does indicate the scope of the re-engineering process.

Having fundamentally restructured its business AGLGN sees no opportunity for further significant improvements. Nevertheless, it has been assumed that AGLGN will achieve cost savings in line with national productivity. National productivity is reflected in movements in the CPI. In this context AGLGN has assumed that its base operating costs will increase in line with CPI.

In addition AGLGN is facing costs for new activities over and above base traditional activities which will add to the cost of operation.

8.2. Additional Costs

8.2.1 Competition Reform

Competition Reform Policy in the gas industry is directed toward reducing prices and costs by the introduction of competitive forces through separation of contestable business components from monopoly components. However, the separation of businesses and responsibilities has the effect of creating new activities some as a result of further regulation of the disaggregated components, some as a result of competition itself. A number of factors are combining to increase the annual operating costs of Gas Networks. Some of these factors and their estimated impact on annual operating costs are :

8.2.1.1 Contestability

AGLGN is assuming in the Access Arrangement that there will be a phasing in of contestability which is different from the current NSW policy as follows:

- Down to customers using > 2 TJ pa from 1 July 1999;
- All customers from 1 July 2000.

Cost associated with contestability arise out of the following activities:

- Customer Churn
- Capacity Enquiries.
- Requests for Service
- Gas Balancing
- IT Costs

The forecast impact on operating costs of tariff market contestability is approximately $7.1m pa.

8.2.1.2 Ringfencing

The legal requirement to ringfence its operations and ensure adequate policies and procedures are implemented has resulted in an estimated increase in annual operating costs of $0.5m. This estimate includes the cost the duplication of various legal and accounting requirements, employing a ringfencing compliance officer and training but excludes the cost of amendments to information systems and costs associated with the contestability of the retail market.

8.2.1.3 Regulatory Compliance

With increasing regulation, and the greater burdens of proof required to demonstrate prudence, more resources are required to ensure the effective operation of compliance systems. The publication of AS3806 – Compliance Programs – early in 1998, the formation of the Association for Compliance Professionals of Australia, and the numbers of conferences and public fora now being conducted on the general subjects of risk management and compliance are evidence of this.

8.2.2 Year 2000 Compliance

Like all major Australian companies AGL has a significant investment in information systems, computer controlled communications and operation equipment which is subject to the potential problems arising from the Year 2000 "Bug". AGLGN's various information systems, SCADA systems and a range of other computer controlled hardware are being reviewed and modified to ensure Year 2000 Compliance. The AGL Group has reported to the Australian Stock Exchange on its status.

8.3. Key Performance Indicators

8.3.1 Australian KPIs

Australian Key Performance Indicators 1998 are shown below:

	AGLGN	GSN	Multinet	Stratus	Westar	AGC
Operating cost per customer ($)						
- Actual	176	108	80	102	93	83
- Adjusted for 90% penetration	105	108	80	102	93	83
Operating cost per km ($k)	4.1	2.5	5.3	4.4	5.1	4.0

Due principally to climate, on line penetration is much greater in the colder climates of Australia. AGLGN's penetration is 56% compared with 90% for the Victorian gas companies. It is understood GSN's penetration is similar to that of Victorian gas companies. When operating cost per customer is normalised for differences in penetration, then the performance across the companies is comparable, certainly within the precision that these comparisons provide. (Normalisation of AGLGN costs has been calculated on the assumption of marginal operating costs of $30 per customer).

Again due to climate, AGLGN has to invest much more in marketing than those companies operating in colder climates in order to grow and realise potential economies of scale that are available. If marketing costs are removed from the comparisons, then AGLGN's cost per customer falls from $105 to $88 and is then below GSN, Stratus and Westar.

8.3.2 US Comparisons

In contrast to Australia the US has a significant amount of data publicly available on gas utility operating costs which is in a standard format established by the Federal Energy Regulatory Commission (FERC). However the same problems of comparability arise because of the environmental differences which affect costs between each utility. The two following comparisons provide useful insight into the efficiency of AGL Gas Networks operations when compared with a range of US utilities. Data on the US utilities has been sourced from the US information organisation OPRI. The sample comprises the 35 largest US gas utilities. (see listing of utilities in Attachment 4).

Two comparisons have been undertaken:

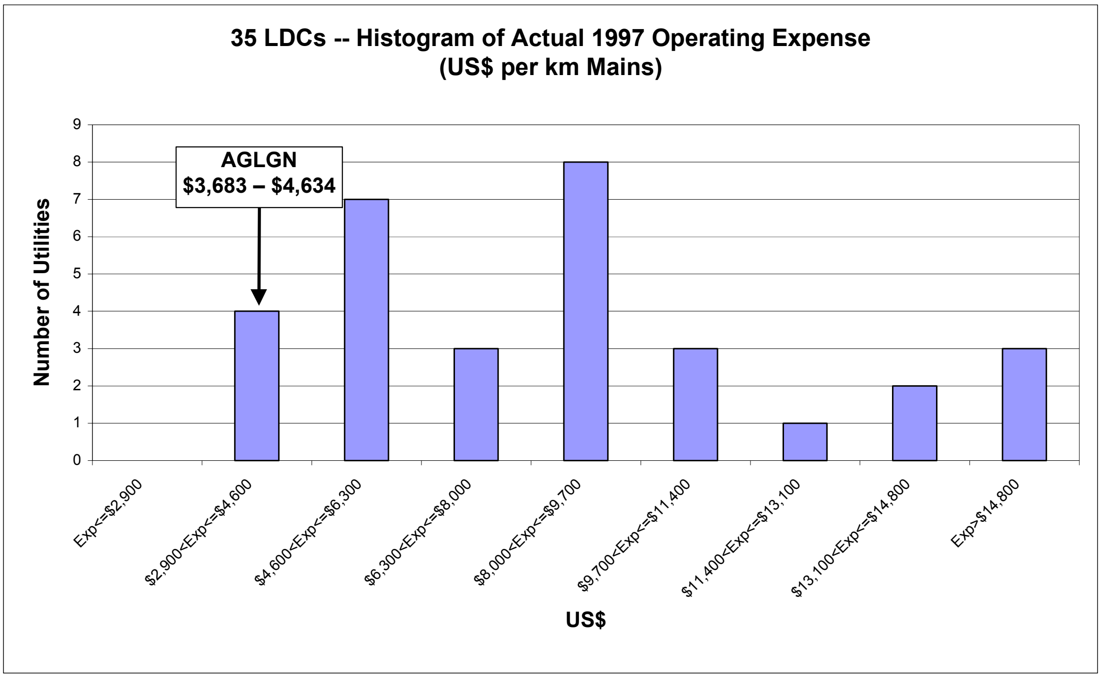
(i) A static comparison of KPIs. AGLGN for 1997/98 and the US companies for calender year 1997 is used. This comparison is complicated by the choice of an appropriate exchange rate. In the light of the volatility of the exchange rate in recent years a range of 62 – 78 US cents per $A has been used.

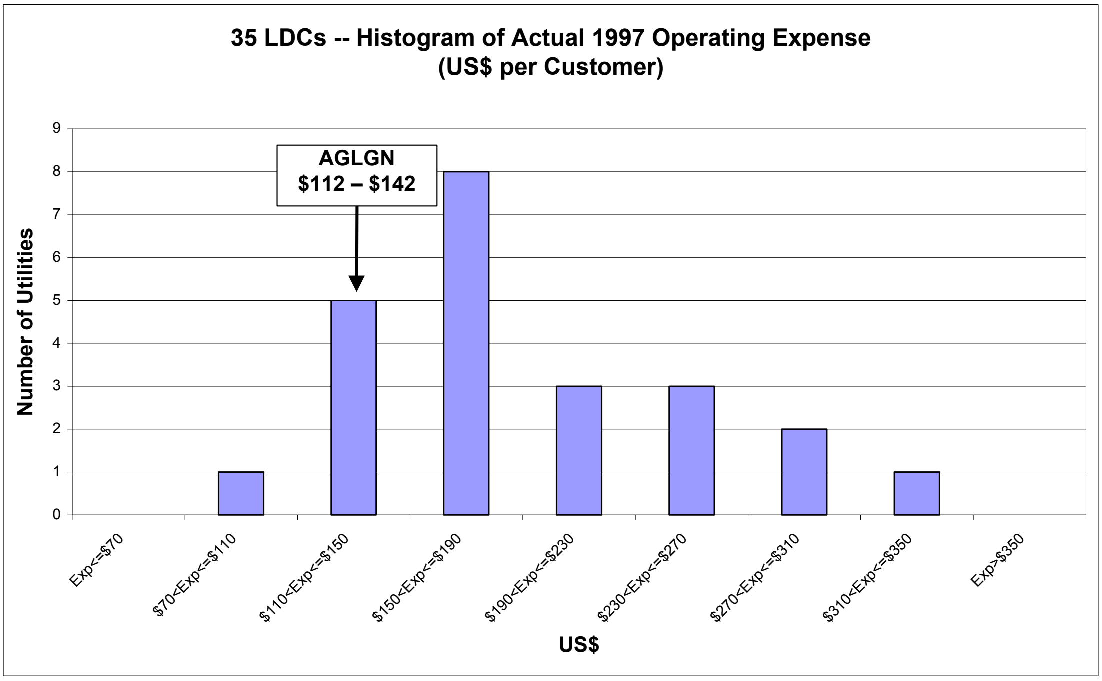
    The same KPIs have been used for comparisons with US companies as were used for Australian companies:

    (a) $ Total Operating Expense per km of main
    (b) $ Total Operating Expense per customer

(ii) A trend comparison of the rate of change of costs is used. For this comparison trends of the Operating Cost KPIs for the AGL Gas Companies (bundled utility) has been used as the figures for the network component of the business cannot be separated. As the greater majority of the costs of the bundled utility are network related and movements rather than absolute values are being compared this is considered to be a reasonable proxy to comparing actual movements in network cost KPIs. This comparison provides understanding of whether AGLGN is introducing cost efficiency improvements at rates that are comparable with US counterparts.

Static Comparison

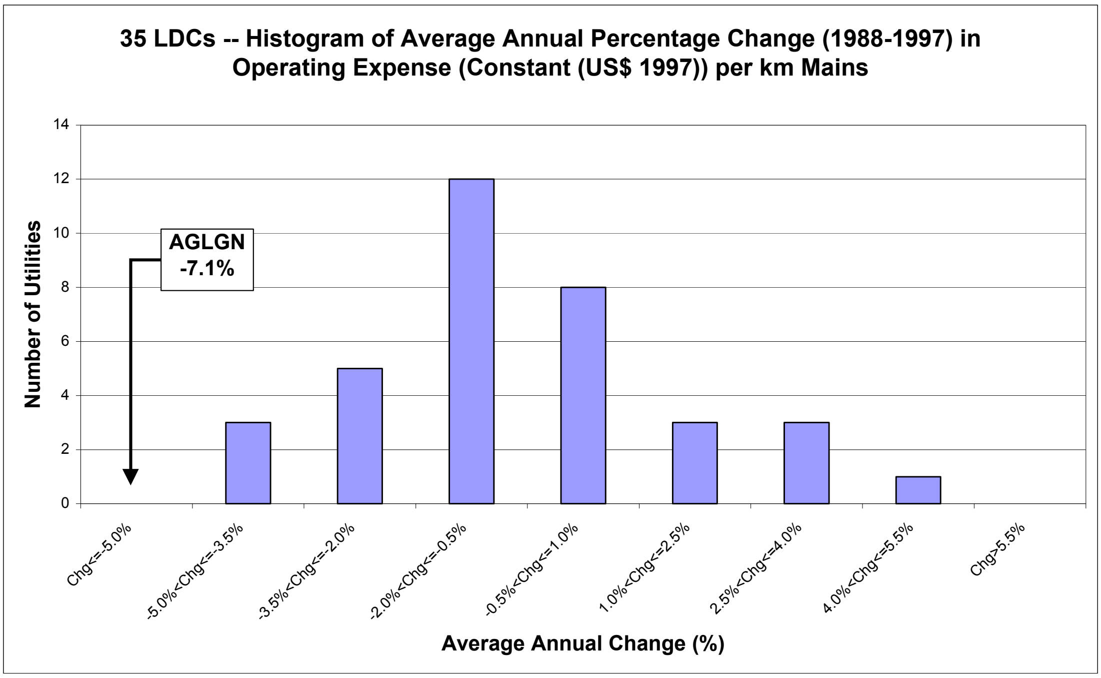


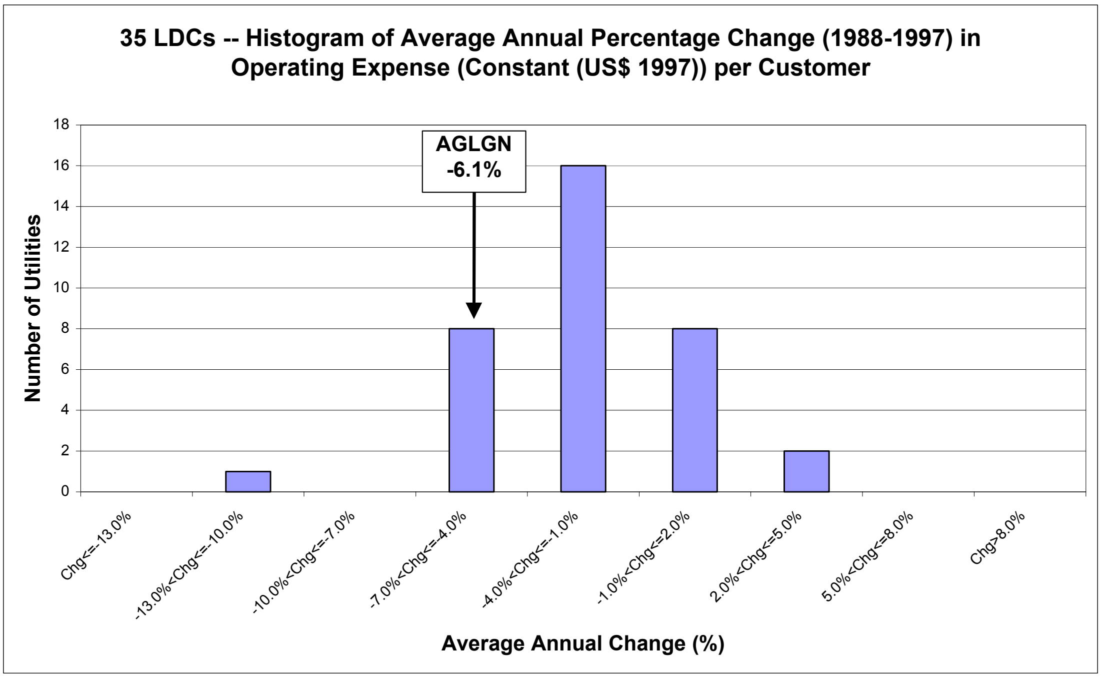


These comparisons clearly show that AGLGN is in the range of costs where an efficient utility would be expected to fall.

(Note that there are fewer than 35 data points in each of the static comparison histograms because 1997 data was not available for all of the selected gas utilities.)

Trend Comparison





This comparison shows a cost efficiency improvement trend of a similar order or higher against US gas utilities.

ATTACHMENTS

Attachment 1: Operating Cost Breakdown

Attachment 2: Advantages and Disadvantages of Each Asset Valuation Methodology

Attachment 3: Map of the Network

Attachment 4: US Gas Utilities Selected For KPI Comparisons

Attachment 5: Gas Networks Design Criteria and Performance Validation for Supply Reliability and Growth

Attachment 6: Optimised Contract Stand Alone methodology

ATTACHMENT 1 – OPERATING COST BREAKDOWN

Operating Costs for AGL Gas Networks businesses are broken down in two structures:
1. by nature of expenditure
2. by activity

as follows:

By Nature ($m)

	1998
Labour & labour related	32.8
Materials and supply	2.9
Contractor services	8.7
Outside services	63.7
Property taxes & council rates	0.4
Computer related	4.2
Communication Related	0.9
Other cost (incl. cust. Connection)	(7.4)
Government levies	9.8
Unaccounted for Gas	8.9
Total	124.9

By activity ($m)

	1998
Operation and Maintenance	24.7
Customer Accounts	6.3
Marketing	35.7
Administration and General	39.5
Government levies	9.8
Unaccounted for Gas	8.9
Total	124.9

Fixed versus Variable

Network costs do not vary with throughput. However network costs increase as new customers are connected and the distribution network expands.

Cost allocation between regulated and unregulated segments

AGLGN operations, which include distribution networks in the Australian Capital Territory and Queanbeyan (ACT&Q) are managed as one operation. For purposes of this Access Arrangement, only costs related to NSW networks are included. Costs relating to ACT&Q are separated by means of an activity based cost model, which traces 42 activities performed by AGLGN. The activities costs are then traced to NSW network and ACT&Q network via the relevant tracing factor for each activity.

ATTACHMENT 2 – ADVANTAGES AND DISADVANTAGES OF EACH ASSET VALUATION METHODOLOGY

Non Optimised Replacement Cost

A non optimised replacement cost is a straight replacement cost estimating the efficient cost of constructing the asset in question following the same physical parameters (eg diameter, location) currently exhibited by the asset.

Advantages	Disadvantages

• asset estimated at current value, providing a consistent valuation between new and existing assets;
• prices based on valuation are likely to send reasonably correct price signals as to the economic cost of providing the service, hence price shocks are unlikely to occur when assets are replaced;
• relatively easy to calculate;
• can be indexed for inflation.
	• does not take into account revenue sustainability (eg the future attractiveness of alternate fuels, future expected technological changes);
	• does not take into account
	  • excess or constrained capacity; and
	  • geographical shifts in the market rendering some assets redundant;
	• perception of asset owners receiving a return on capital they did not invest , or of users paying for assets twice;
	• not within the range of valuations to be examined by regulators.

Optimised Replacement Cost

ORC involves estimating the efficient cost of constructing the asset in question to meet today's market and using today's technology. ORC effectively represents

- a market valuation in the sense that any it is the amount that any notional competitor would have to spend today in order to replicate the asset; and
- an estimate of the efficient cost of constructing the asset.

Advantages	Disadvantages
• asset estimated at current value, providing a consistent valuation between new and existing assets; • prices based on valuation are likely to send correct price signals as to the economic cost of providing the service, hence price shocks are unlikely to occur when assets are replaced; • allows the benefits of technological improvement to be passed on in prices; • does not allow costs of excess assets to be passed on in prices, reducing exposure to bypass; • can be indexed for inflation.	• does not take into account revenue sustainability (eg the future attractiveness of alternate fuels, future expected technological changes); • asset stranding resulting from the optimisation process may be contentious; • not within the range of valuations to be examined by regulators; • perception of asset owners receiving a return on capital they did not invest , or of users paying for assets twice.

Depreciated Optimised Replacement Cost

DORC effectively takes an ORC valuation as above and acknowledges the fact that the asset is not new and hence its value should be adjusted for some measure of depreciation. DORC is a measure of the amount that any notional competitor would have spent in the past to replicate the asset based an estimate of the efficient cost of constructing the asset

Advantages	Disadvantages
• asset estimated at current value, providing a consistent valuation between new and existing assets; • prices based on valuation are likely to send reasonably correct price signals as to the economic cost of providing the service, hence price shocks are unlikely to occur when assets are replaced; • allows the benefits of technological improvement to be passed on in prices; • does not allow costs of excess assets to be passed on in prices, reducing exposure to bypass; • can be indexed for inflation; • within the range of valuations to be examined by regulators, and has been accepted by regulators (eg ORG, ACCC).	• does not take into account revenue sustainability (eg the future attractiveness of alternate fuels, future expected technological changes); • asset stranding resulting from the optimisation process may be contentious; • depreciation process, including selection of asset life and selection of depreciation method, may be somewhat arbitrary; • perception of asset owners receiving a return on capital they did not invest , or of users paying for assets twice.

Optimised Deprival Value

ODV is the value of future benefits the asset owner would lose if it were deprived of the asset. ODV is essentially the lesser of DORC and the Economic Value (EV) of the asset, where the EV of the asset is the greater of the NPV of the asset to end users (as assessed using sustainable future net cash flows from users) and its disposal value.

Some regulators use a "line in the sand" ODV which is a practical application of ODV. This method eliminates the circularity disadvantage by setting a "line in the sand" as a value and then calculating EV from this point. This "line in the sand" may be arbitrary or based on assumptions that previous valuations or prices were correct..

Advantages	Disadvantages
• takes into account revenue sustainability (eg the future attractiveness of alternate fuels, future expected technological changes); • asset estimated at current value, providing a consistent valuation between new and existing assets; • prices based on valuation are likely to	• asset stranding resulting from the optimisation process may be contentious; • depreciation process, including selection of asset life and selection of depreciation method, may be somewhat arbitrary; • the calculation of EV, in particular the use of NPV, may be circular if the asset value is an input into the NPV calculation

send reasonably correct price signals as to the economic cost of providing the service, hence price shocks are unlikely to occur when assets are replaced; • allows the benefits of technological improvements to be passed on in prices; • does not allow costs of excess assets to be passed on in prices, reducing exposure to bypass; • can be indexed for inflation; • likely to be within the range of valuations to be examined by regulators, and has been accepted by regulators (eg New Zealand);	(as is the case in the many regulatory systems); • perception of asset owners receiving a return on capital they did not invest , or of users paying for assets twice.

DAC

DAC is the book cost of the asset as constructed or purchased and then depreciated. DAC is a backward looking valuation rather than a present or future valuation. It bears no relationship to future or current cash flows generated by the asset.

Advantages	Disadvantages
• there is no perception of asset owners receiving a return on capital they did not invest , or of users paying for assets twice; • widespread business, accounting, regulatory and legal recognition; • within the range of valuations to be examined by regulators, and has been accepted by regulators (eg US); • ease of calculation; • does not address contentious issues such as optimisation, stranding, technological change and the calculation of economic value.	• makes no attempt to value assets at their current or market value; • takes no account of optimisation for previous over engineering, current markets and current technology; • takes no account of revenue sustainability; • takes no account of inflation or other exogenous influences which may have an impact on asset prices; • prices based on DAC valuation are not likely to send correct price signals as to the economic cost of providing the service, hence price shocks are likely to occur when assets are replaced and previous returns based on DAC are unable to fund new investments; • depreciation process, including selection of asset life and selection of depreciation method, may be somewhat arbitrary;

Market Based Methods

The above methods (DAC, DORC etc) are essentially cost based valuation methods. Market based methods include

- discounted cash flow, which values the asset at the value of the future discounted value of the cash flows generated by the asset
- comparable sales, which values the asset based on comparable sales
- net realisable value, which values the asset at sale price.

For reasons of practicality, objectivity and circularity these methods are inappropriate for long term untraded infrastructure assets.

ATTACHMENT 3 – MAP OF NETWORK

ATTACHMENT 4 – US GAS UTILITIES SELECTED FOR KPI COMPARISON

Atlanta Gas Light Co
Baltimore Gas & Electric Co
Bay State Gas Co
Boston Gas Co
Brooklyn Union Gas Co
Cincinnati Gas & Electric Co
Columbia Gas Of Ohio Inc
Consolidated Edison Co Of New York Inc
Consumers Energy
Dayton Power & Light Co
Equitable Gas Co
Illinois Power Co
Indiana Gas Co Inc
Laclede Gas Co
Louisville Gas & Electric Co
Michigan Consolidated Gas Co (Michcon)
National Fuel Gas Distribution Corp
New Jersey Natural Gas Co
Niagara Mohawk Power Corp
Nicor Gas Co (Northern Illinois Gas Co)
Northern Indiana Public Service Co
NW Natural (Northwest Natural Gas Co)
Pacific Gas & Electric Co
Peoples Gas Light & Coke
Piedmont Natural Gas Co Inc
PSC Of Colorado
PSC Of North Carolina Inc
Public Service Electric & Gas Co
Rochester Gas & Electric Corp
Southern California Gas Co
Southwest Gas Corp (California Div)
Washington Gas Light Co
Washington Natural Gas Co
Wisconsin Gas Co
Wisconsin Natural Gas Co

ATTACHMENT 5 – GAS NETWORK DESIGN CRITERIA AND PERFORMANCE VALIDATION FOR SUPPLY RELIABILITY AND GROWTH

EXCERPT REPRODUCED FROM AGL TECHNICAL POLICY REVIEW COMMITTEE PROCEDURES MANUAL

TECHNICAL POLICY REVIEW COMMITTEE

TPC.PROC. 4.99.5
(to be updated)

GAS NETWORK DESIGN CRITERIA AND PERFORMANCE VALIDATION FOR SUPPLY RELIABILITY AND GROWTH

AUTHORISED BY:	Chairperson TPC [Alf Rapisarda]	DATE:

Gas Network Design Criteria and Performance Validation for Supply Reliability and Growth

1. Purpose

The purpose of this policy is to define the criteria for design of gas distribution systems and outline design control measures to validate such designs so as to ensure distribution network supply reliability and the most efficient growth of the gas distribution system.

2. Scope

This policy applies to all AGL gas networks.

3. References

Australian Standards:	AS1697 SAA Gas Pipeline Code
TPC.PROC.4.99.1:	Distribution System Operating Pressures & Metering Pressures
AGA Codes:	AG603 Gas distribution codes
DD.PROC.4.4.1:	Design control procedures

4. Definitions

TPC:	Technical Policy Review Committee (also referred to as TPRC)
MAOP	Maximum allowable operating pressure
Network: design	A gas distribution system or segment thereof, defined by an autonomous configuration (ie. Supply and terminal points) and operating at a single MAOP.

5. Procedure

5.1 Design Criteria:

- For Design Criteria: Refer to Table 5.1

- All proposed designs must be verified by computer models based on up-to date system data as described in section 5.2.1

- On the completion of the project, the design must be validated against monitored field data. Validation of the systems must be performed as per requirements of section 5.2.

Table 5.1 - Design Criteria

SOURCE OF DESIGN REQUEST	DESIGN INPUTS	DESIGN CAPACITY PROVISION	LONG TERM STRATEGY PLANNING
(a) New contract and tariff projects (b) Capacity enhancement for under-performing networks (c) Enhancement to improve security of supply and reliability of the networks	(i) Data of existing system performance, including computer modelling and simulation. (ii) Current load information. (iii) Potential loads for tariff and contract markets for periods of 5, 10 and 20 years in consultation with area marketing. (iv) Analysis of the requirements and opportunities to improve security and reliability of supply in the area. (v) The minimum pipe size for high pressure networks will be 100 mm. (vi) Tariff market demand is calculated for a 1:20 year winter load factor	(i) Existing contract and tariff loads. (ii) Requested new contract loads. (iii) Projected 5 year growth in tariff market.* (iv) Capacity provisions to improve reliability and security of supply in the area, if justifiable. * Note: To ensure optimum network development, the elements of design which could not be efficiently staged would be allowed to be designed up to the capacity of the existing and requested contract loads and projected 20 year tariff demands.	Strategic plan for the gradual implementation of the design to provide for the contract and tariff markets for the periods after 5,10 and up to 20 years. Before implementation of any stage of the long term strategic plans, network enhancement requirements and opportunities for improving reliability and security of supply must be revised.

5.2 Gas Network Design Validation

5.2.1 Computer models

Every gas network should have a computer model, comprising supply points, loads and basic pipes, established and maintained.

These models will be used to:

- Confirm that systems have sufficient capacity to supply committed loads,
- verify system ability to supply proposed loads,
- simulate new system designs and system changes,
- guide gradual system growth within long term strategies, and
- assist incident response.

Computer models will be established using the network analysis program Stoner.

5.2.2 Model verification

The pressure in all networks will be checked annually (via telemeters or gauging), during peak demand, to test system performance.

The networks will be gauged at supply and terminal points and the frequency and extent of gauging will be determined in regard to the level of system capacity utilisation, system changes and history of supply problems.

5.2.3 Network model maintenance

Levels of network revision

Following each winter all network models should be revised. There are 3 levels of revision based on the minimum terminal pressure recorded during peak demand. Table 5.2 following should be used as an overall guide for the selection of the appropriate level of annual network revision.

The other factors that should be taken into consideration when selecting the level of network revision are;

- risk assessment for security of supply and customer sensitivity,
- sales and marketing movements,
- extent of changes to the system configuration, and
- other system performance data such as supply problems, frequency of customer complaints, incidents, emergencies, ...etc.

Note 1: A level 3 revision is required for every network at least once every 5 years.

Note 2: Manager Network Design Services is to approve level of revision to be performed

Table 5.2 - Revision level vs terminal pressure (kPa)

System MAOP	System minimum pressure	Network revision level		
		Level 1	Level 2	level 3
Sydney Trunk	NA	All Annual Revisions will be Level 3		
3400	1700	All Annual Revisions will be Level 3		
1050	525	850	700	600
400	70	300	200	150
300	70	250	200	150
210	70	160	140	120
100	40	80	70	60
7	3.5	5	4.5	4
2	1.5	Network analysis not required		

5.2.4 Scope of network revision

In order to maintain gas system reliability, the following scope of computer model network revision is recommended:

Level 1: Revision for level 1 will include:

- general balance of computer network model against recorded pressure results with minimal updating of system configuration and major load changes,
- confirm and recommend minor system upgrades, and
- verify configuration of isolation valves as defined in level 3.
- test and verify timing of system reinforcement as guided by strategic plan from level 3, and
- verify and amend isolation valves as defined in level 3.

Level 2: Revision of level 2 will include;

- update concentrated loads
- confirm configuration of major network components (supply points and larger mains).
- Update tariff loads with an assumption of general increase and distribution
- balance computer network model to the monitoring results and updated data.
- Test and verify timing of system reinforcement as guided by strategic plan from level 3, and

- Verify and amend isolation valves as defined in level 3.

Level 3: Revision of level 3 will include;

- total detailed updating of concentrated and distribution of tariff loads,
- verification of capacity of supply points and pipe/size configuration,
- balance computer model against current winter monitoring with updated system data,
- risk assessment of security for failure of major network components,
- developed long term growth based on updated 10 year marketing forecast,
- verify supply ability of the interfacing pressure networks, and
- design isolation criteria for area & shopping centre isolation sector risk assessment for security of supply and customer sensitivity

6. Documentation

The results of revisions for all networks will be compiled into the report. The report will include:

- Description of the network,
- map of network supply configuration
- results of monitoring and computer network modelling,
- statement of risk assessment in reference to network configuration,
- design inputs to validation process, and
- recommendations for system enhancements so as to ensure supply reliability.

Reports will be retained in the Network Design Services filing system for the given level of network revision as follows:

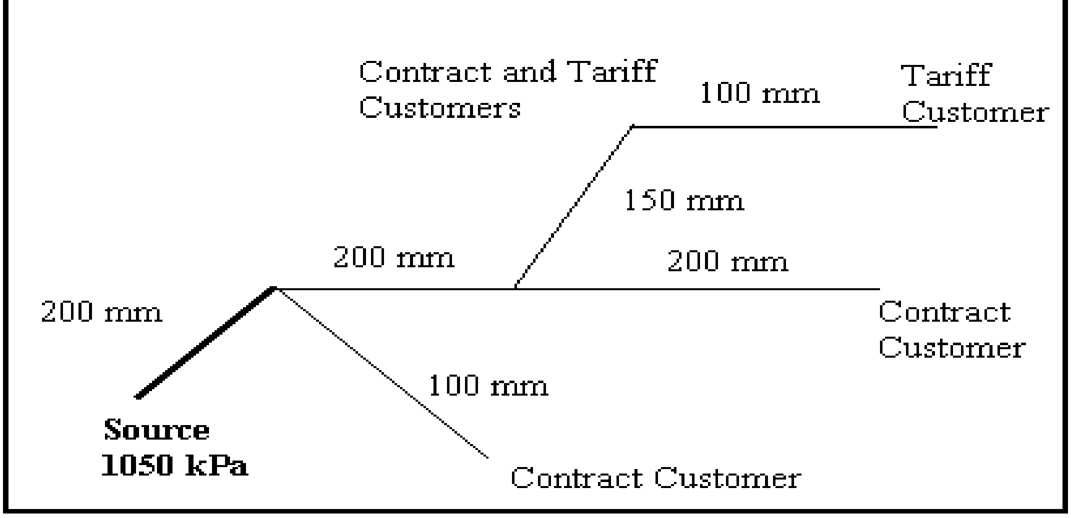
level 1: 2 years
level 2: 3 years
level 3: 7 years

ATTACHMENT 6 – OPTIMISED CONTRACT STAND ALONE METHODOLOGY

For the purpose of revenue allocation, the contract market's share of the replacement cost of the local network assets is taken to be the cost of the "optimised stand-alone" design for the local network that would be required to serve the contract market alone. The procedure by which the optimised stand-alone design was established is described below. The replacement cost of this design was then calculated using the unit costs agreed to by J. P. Kenny (adjusted to 1999 values).

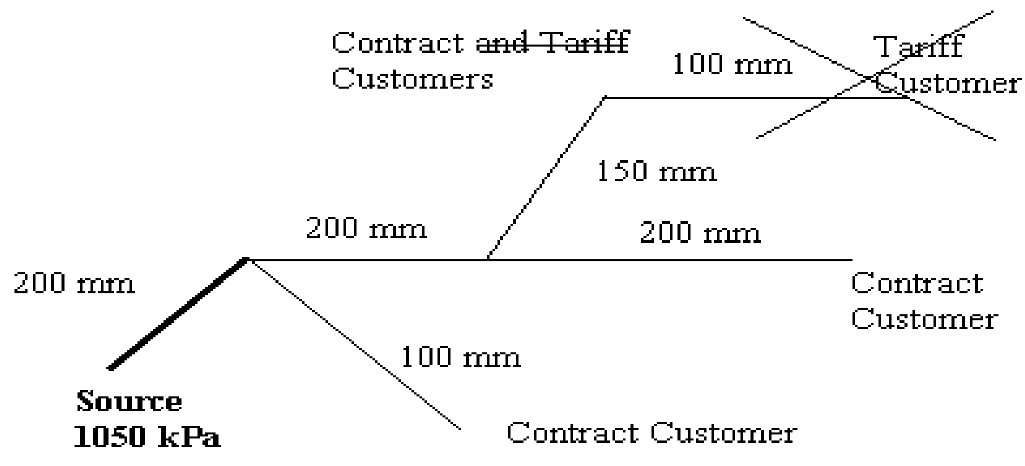
The high pressure local networks were analysed using the Stoner Network Package. The design of the networks for the contract customers alone was based on the current configuration of the distribution networks (Figure 1).

Figure 1 : Current Distribution System



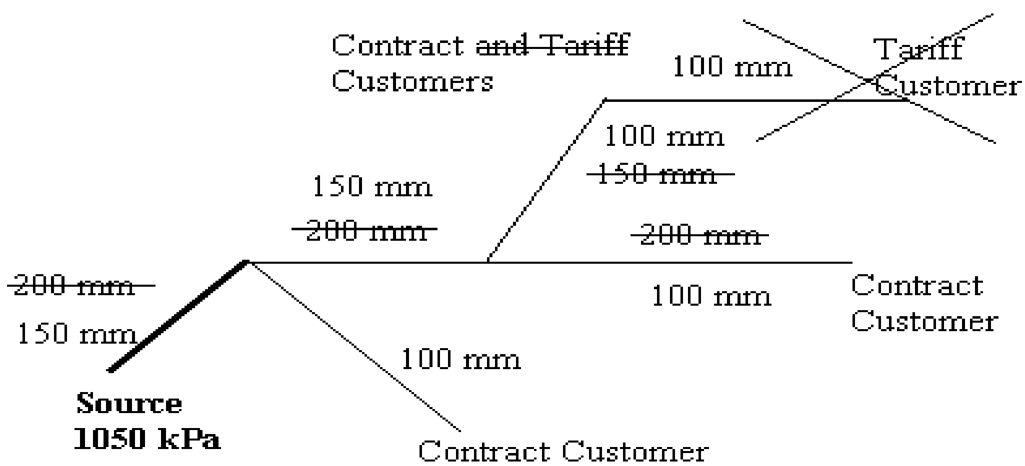
Mains which did not service any contract customers were considered to be redundant and were therefore removed (Figure 2). In the case where a contract customer was supplied from the medium pressure system, the nearest secondary system was assigned to these customers. Their optimised medium pressure assets were accounted for in the asset database and in the pricing model.

Figure 2: Removal of Mains Serving Tariff Market Only



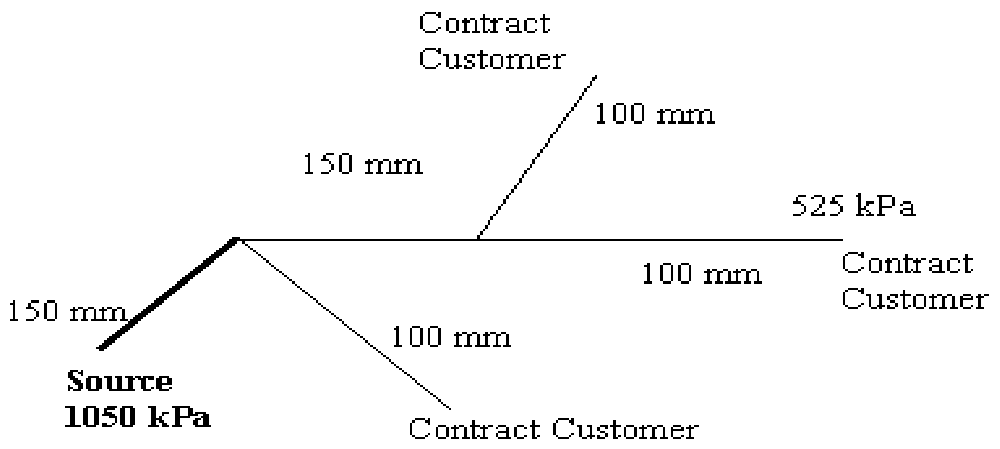
The mains were re-sized to maximise the utilisation of the network systems. Pipes were down-sized where required to eliminate any excess capacity and no redesigned pipe was allowed to be larger than that currently in the ground (Figure 3). Only standard pipe sizes were used and the smallest pipe used was 100 mm steel.

Figure 3: Down-sizing of Mains



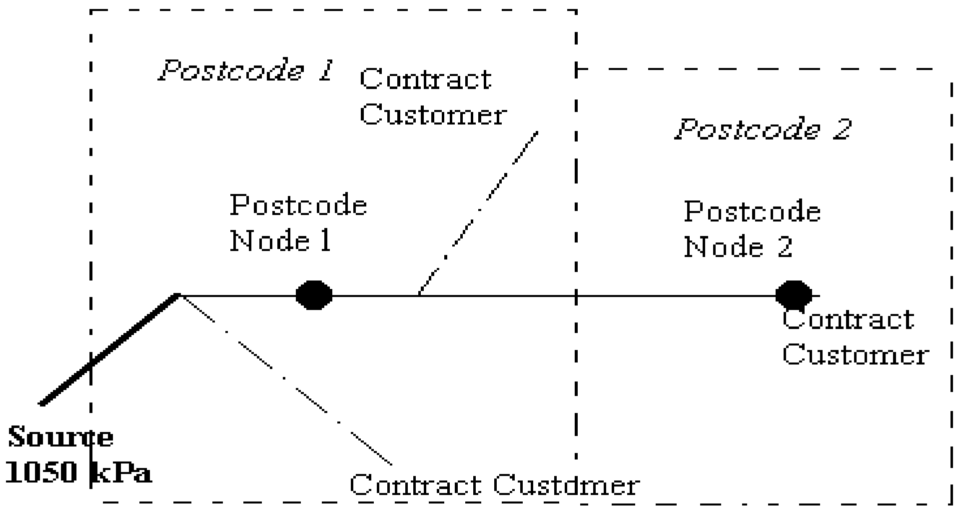
The minimum allowable pressures adopted for the primary and secondary networks were 1750 kPa and 525 kPa, respectively (Figure 4).

Figure 4: Optimised Contract Stand-Alone Design



The loads used to design the optimised stand-alone system network were based on historical customer usage data collected over the period of July 1997 and October 1998. The design flowrates where determined using customer consumption data.

Figure 5: Transportation Model on Postcode Basis



In the transportation methodology, the share of assets of each contract customer using the Local Network is calculated to a “postcode node” (Figure 5), which is defined as the central network node within each postcode. The loads of all contract customers within the postcode are aggregated at this node. Any network branches (— · —) serving the customers are also taken into account as assets within that particular postcode. By network analysis, the flow through each pipe segment to a postcode node is determined and the local network charges derived.

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