AlintaGas's Access Arrangement Information for the Mid-West and South-West Gas Distribution Systems

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AlintaGas
1 William Street
Perth WA 6000

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1. Introduction

1.1 Access Arrangement Information submitted by AlintaGas

This *Access Arrangement Information* is required under clause 2.2 of the *Code*.

1.2 Interpretation

Unless the text indicates otherwise, words in this *Access Arrangement Information* have the same meaning as in *AlintaGas's Access Arrangement for the Mid-West and South-West Gas Distribution Systems* submitted to the *Regulator* on 30 June 1999.

2. Information regarding access and pricing principles

2.1 Tariff determination method

The *reference tariffs* in the *Access Arrangement* have been designed to recover a portion of *AlintaGas's total revenue*. *AlintaGas's total revenue* is an amount equal to the cost of providing all *services* that are provided by means of the *AlintaGas Network*.

The *services* provided by means of the *AlintaGas Network* are:

- *Reference Service A*;
- *Reference Service B1*;
- *Reference Service B2*;
- *Reference Service B3*;
- an *Interconnection Service*; and
- *listed ancillary services*.

The list above is not exhaustive of the *services* that *AlintaGas* is prepared to make available. *AlintaGas* will negotiate regarding any other *service* or element of a *service* requested by a *prospective user*.

The costs of providing *Reference Service A*, and *Reference Services B1*, *B2* and *B3* are to be recovered through *Reference Tariff A*, and *Reference Tariffs B1*, *B2* and *B3*, respectively. The price upon which an *Interconnection Service* will be made available is to be negotiated by *AlintaGas* and the person to whom that *Service* is provided. The *tariffs* for *listed ancillary services* are those set out in Schedule 8 of the *Access Arrangement* as amended or substituted from time to time by *AlintaGas* and approved by the *Regulator*.

The structure of the *reference tariffs* is described in subsection 2.2 of this *Access Arrangement Information*.

Reference Tariff A and *Reference Tariffs B1*, *B2* and *B3* are initially determined from the forecast total cost of providing *Reference Service A* and *Reference Services B1*, *B2* and *B3* in the first year of the *Access Arrangement*.

The forecast total cost of providing *Reference Service A* and *Reference Services B1*, *B2* and *B3* in the first year of the *Access Arrangement* is determined by subtracting the forecast cost of providing *listed ancillary services* and any other *services* from the forecast cost of providing all *services* by means of the *AlintaGas Network* in that year. The forecast cost of providing all *services* by means of the *AlintaGas Network* in the first year of the *Access Arrangement* has been determined using the *cost of service* method. It is calculated as the sum of:

- a *return* on the *capital base*;
- *depreciation* of the *capital base*; and
- *non-capital costs*.

The components of the forecast total costs of providing *Reference Service A* and *Reference Services B1*, *B2* and *B3* in the first year, and in subsequent years, of the *Access Arrangement* are set out in subsection 2.4 of this *Access Arrangement Information*.

Determination of the *Initial Reference Tariffs* proceeds through a multistage cost allocation approach. In this approach, the forecast total cost of providing *Reference Service A* and *Reference Services B1*, *B2* and *B3* in the first year of the *Access Arrangement* is allocated to *Reference Tariff A* and *Reference Tariffs B1*, *B2* and *B3*. The cost allocation approach and the determination of the *Initial Reference Tariffs* are described in subsection 2.5 of this *Access Arrangement Information.*

The Initial *Reference Tariffs* are set out in subsection 2.6.

Clause 25 and Schedule 2 of the *Access Arrangement* set out the way in which *reference tariffs* may be varied in the second and subsequent years of the *Access Arrangement*. *Reference tariffs* are to be varied in accordance with a predetermined price path. The price path - the form of regulation - and its incentive properties are described in subsection 2.7 of this *Access Arrangement Information*.

2.2 Reference tariff structure

2.2.1 Reference Service A/Reference Tariff A

Reference Service A is a *service* for *users* requiring delivery of 35 TJ/year or more at a *delivery point* in each year of a *Haulage Contract*, and requesting a *contracted peak rate* greater than or equal to 10 GJ/hour. *Users* requiring *Reference Service A* tend to be those *users* making efficient use of the *AlintaGas Network*. For this group of *users*, higher annual volumes tend to be associated with higher load factors.

The estimated number of *delivery points* for *users* requiring *Reference Service A* is shown in Table 6.6 of subsection 6 of this *Access Arrangement Information*. The total volumes of gas expected to be delivered at these *delivery points* in each year of the *Access Arrangement* are shown in Table 6.4 of section 6.

Users requiring *Reference Service A* require that *service* for the delivery of gas to larger commercial and industrial installations. Their requirements for service pipes, regulators, meters and associated facilities are generally specific to the installations to which *AlintaGas* delivers gas. *Reference Tariff A* has therefore been designed to recover from each *user*:

- the cost incurred in using the AlintaGas Network; and
- the cost of providing *user specific delivery facilities.*

Relatively stable paths from *receipt points* to *delivery points* can be identified for gas flows through the *high pressure system*. The network assets used to deliver gas to each *delivery point* at which a *user* takes *Reference Service A* can therefore usually be identified. (Most *users* requiring *Reference Service A* require delivery of gas to *delivery points* located on the *high pressure system*.) In consequence, the component of *Reference Tariff A* that recovers the cost of network use can be designed to recover the costs of installing, operating and maintaining the assets required to provide a *user* with *Reference Service A*. The cost incurred by *AlintaGas* in providing a *user* with *Reference Service A* is determined by:

- the location of the *delivery point* at which gas is delivered to the *user*;
- the use the *user* makes of the c*apacity* of the *AlintaGas Network*; and
- the volume of gas delivered to the *user* at the *delivery point*.

For network management, *AlintaGas* requires that metering installed immediately upstream of a *delivery point* at which a *user* requires delivery of 20 TJ/year or more be capable of measuring, storing, and transmitting by telemetry, peak flow. This measurement of peak flow is an indicator of the use made of the *capacity* of the *AlintaGas Network* by a *user* requiring *Reference Service A.*

Reference Tariff A has therefore been designed to recover the cost of use of the *AlintaGas Network* through:

- a standing charge;
- a demand charge;
- a usage charge; and
- a charge for *user specific delivery facilities*.

(The values of the components of *Reference Tariff A* are set out in Table 2.3 of subsection 2.6 of this *Access Arrangement Information*.)

The inclusion of a standing charge in *Reference Tariff A* is a recognition that the costs of installing, operating and maintaining a gas distribution system are largely fixed. It also serves the important purpose of ensuring that the structure of *reference tariffs* provides an appropriate signal for transfer from *Reference Service B1* to *Reference Service A* as the volume of gas delivered to a user approaches 35 TJ/year.

The demand charge recovers that portion of the cost of use of the *AlintaGas Network* determined by the location of a *user's delivery point*, and by the use the *user* makes of the *capacity* of the network. It is a charge for use of the *AlintaGas Network* measured as the product of use of *capacity* and location. For the purpose of determining this charge, a *user's* use of *capacity* is measured as the *user's contracted peak rate* expressed in GJ per hour. Location is defined in terms of the distance, in kilometres, measured in a straight line, from the *user's delivery point* to

the nearest transmission pipeline, irrespective of whether or not that pipeline is interconnected with the *AlintaGas Network*. The demand charge is, in consequence, a charge per GJ-km.

Use of distance to the nearest transmission pipeline as the measure of distance in the demand charge of *Reference Tariff A* is intended to mitigate the risk of inefficient by-pass of the *AlintaGas Network.*

The demand charge of *Reference Tariff A* is not a linear function of distance for a given *contracted peak rate*. A declining block structure, with two distance-based blocks, has been adopted to provide better cost reflectivity in the tariff. *Users* requiring *Reference Service A* for delivery of gas to *delivery points* located at distances greater than about 10 km from the nearest transmission pipeline are usually supplying at *delivery points* in urban fringe and rural areas. In these areas, the costs of pipe laying are lower than in more densely populated urban areas.

The usage charge of *Reference Tariff A* is a charge which recovers that portion of the cost of use of the *AlintaGas Network* determined by the *user's* location, and by the volume of gas delivered to the *user* at a *delivery point*. It is a charge per GJ-km and, like the demand charge, has a distance-based declining block structure.

In addition to paying the demand and usage charges of *Reference Tariff A*, a user of *Reference Service A* will pay a charge for service piping, regulators, meters and associated facilities. That charge will be user-specific, being determined by the costs incurred by *AlintaGas* in connecting the *user's* facilities to the *AlintaGas Network.*

2.2.2 Reference Service B1/Reference Tariff B1

Reference Service B1 is a *service* for *users* requiring less than 35 TJ/year at a *delivery point*, or having a *contracted peak rate* less than 10 GJ per hour.

The estimated number of *delivery points* for *users* requiring *Reference Service B1* is shown in Table 6.6 of section 6. The total volumes of gas expected to be delivered at these *delivery points* in each year of the *Access Arrangement* are shown in Table 6.4.

Users requiring *Reference Service B1* require that *service* for the delivery of gas to a wide range of commercial and industrial installations. These installations take between about 1 TJ/year and 35 TJ/year. For those *users* in this group taking smaller annual volumes, stable paths for gas flow through the network cannot be identified. Many of these *users* take gas at *delivery points* on the *medium pressure/low pressure system*. The largest part of the *medium pressure/low pressure system* is an integrated network supplied from over 120 points of interconnection with the *high pressure system*. The pattern of gas flow through the *medium pressure/low pressure system* varies continuously over time with variations in flow through the *high pressure system*, and variations in the volume of gas taken at *delivery points*.

Furthermore, many *users* requiring *Reference Service B1* require less than 20 TJ/year at a *delivery point*. They will not require metering capable of measuring, storing, and transmitting by telemetry, peak flow.

Accordingly, the cost of providing *Reference Service B1* is not, in general, directly related to the location of the *user's delivery point* and to the use the *user* makes of the *capacity* of the *AlintaGas Network*. In tariff design, the cost of providing *Reference Service B1* must be, at least in part, related to the volume of gas delivered to a *user* at a *delivery point*. The cost of providing *Reference Service B1* will also include a fixed component because the costs of installing, operating and maintaining the *AlintaGas Network* are largely fixed.

Users requiring *Reference Service B1* require that *service* for the delivery of gas to a broad range of commercial and industrial installations. Their requirements for service pipes, regulators, meters and associated facilities are generally specific to the installations to which they deliver gas. They cannot be supplied using the standard facilities of *Reference Service B2* or *Reference Service B3*.

Reference Tariff B1 has therefore been designed to recover the cost of use of the AlintaGas Network through:

- a standing charge;
- a usage charge; and
- a charge for *user specific delivery facilities*.

The standing charge for *Reference Tariff B1*, like the standing charge for *Reference Tariff A*, not only recovers fixed costs. It also ensures that the structure of *reference tariffs* provides an appropriate signal for transfer from *Reference Service B2* to *Reference Service B1* as the annual volume of gas delivered to a user increases.

The usage component of *Reference Tariff B1* is a charge which recovers that portion of the cost of use of the *AlintaGas Network* determined by the volume of gas (measured in GJ) delivered to a *user* at a *delivery point*.

2.2.3 Reference Services B2 and B3/Reference Tariffs B2 and B3

Reference Services B2 and *B3* are *services* for *users* requiring delivery of smaller volumes of gas at *delivery points* on the *medium pressure/low pressure system*. *AlintaGas* has standardised, to the extent technically and commercially reasonable, the types of facilities it uses at these *delivery points*. In particular, the metering makes use of either a *standard 12 m^3/hr meter*, or a *standard 6 m^3/hr meter*. These meters record volumes of gas delivered, but not peak flows.

Reference Service B2 is a *service* for *users* supplying smaller commercial and small industrial consumers requiring delivery of gas at a *delivery point* on the *medium pressure/low pressure system*, and requiring a meter capable of delivering up to 12 cubic metres of gas per hour.

Reference Service B3 is a *service* for *users* supplying residential and smaller commercial and industrial consumers requiring delivery of gas at a *delivery point* on the *medium pressure/low pressure system*, and requiring a meter capable of delivering up to 6 cubic metres of gas per hour.

The estimated number of *delivery points* for *users* requiring *Reference Services B2* and *B3* are shown in Table 6.6 of section 6 of this *Access Arrangement Information*. The total volumes of gas expected to be delivered at these *delivery points* in each year of the *Access Arrangement* are shown in Table 6.4 of section 6.

Reference Tariffs B2 and B3 will have two components:

- a standing charge; and
- a usage charge.

The standing charges of *Reference Tariffs B2* and *B3* are annual charges that recover fixed costs, including the costs of *standard delivery facilities*. The standing charge for *Reference Tariff B2* also ensures that the structure of *reference tariffs* provides an appropriate signal for transfer from *Reference Service B3* to *Reference Service B2* as the annual volume of gas delivered to a *user* increases.

The usage charges of *Reference Tariffs B2* and *B3* are charges which recover that portion of the cost of use of the *AlintaGas Network* determined by the volume of gas (measured in GJ) delivered to a *user* at a *delivery point.* These charges have a declining block structure that is intended to encourage use of gas by residential consumers. The declining block structures of *Reference Tariffs B2* and *B3* are intended to complement the block structures in the retail prices payable by small business and residential consumers at the time the *Initial Reference Tariffs* were determined.

2.3 Reference Tariff zones

Consideration was given to the creation of pricing zones to permit *Reference Tariffs B1, B2* and *B3* to more accurately reflect the costs of providing the corresponding *reference services*. However, the implementation of a scheme of cost-reflective pricing zones was found to be impractical. A major part of the *AlintaGas Network* in the Perth metropolitan area forms a single integrated gas distribution network. A number of smaller networks, separate from the Perth metropolitan network, can be identified. To use these smaller networks as a basis for separate pricing zones would result in increases in distribution charges for gas supplied to some *delivery points*, and would result in substantial retail price increases for at least some gas consumers.

2.4 Forecast total costs of providing reference services

The forecast total costs of providing *Reference Service A* and *Reference Services B1, B2* and *B3* in the first year, and in subsequent years, of the *Access Arrangement* are shown in Table 2.1.

Table 2.1
Forecast total costs of providing reference services
Year ending 31 December

	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Return on capital base	45.3	47.0	48.3	49.5	50.7
Depreciation	17.4	18.8	20.0	21.2	22.4
Return on working capital	1.4	1.4	1.5	1.5	0.8
Non-capital costs	37.0	36.2	36.6	37.2	38.3
Total	101.1	103.4	106.4	109.4	112.2

The methods by which the *return* on the *capital base*, *depreciation* and the *return* on working capital have been determined are set out in section 3 of this *Access Arrangement Information*. The principal components of the *non-capital costs* are set out in sections 4 and 5.

2.5 Cost allocation

Reference tariffs have been determined by allocating the forecast total cost of providing *Reference Service A* and *Reference Services B1, B2* and *B3*, in the first year of the *Access Arrangement*, to *Reference Tariff A* and *Reference Tariffs B1, B2* and *B3*, using a multistage approach to cost allocation.

The forecast total cost of providing the *reference services* has been allocated to three "cost baskets", and costs in the three cost baskets have then been allocated to three "cost pools". The costs collected in the cost pools are allocated to *Reference Service A* and to *Reference Services B1, B2* and *B3*. These allocations are shown in Figure 2.1.

The allocation of cost pools to *reference services* is the basis for the allocation of costs to *user*s via the *reference tariffs*. This allocation of *reference service* costs to *reference tariffs* is shown in Figure 2.2.

The allocation of the forecast costs of providing the *reference services* to cost baskets is direct (that is, there is no apportionment of costs). The *return* on the *capital base* and *depreciation* are allocated directly to an Asset Costs cost basket. Operating and maintenance costs are allocated directly to an Operating and Maintenance (O & M) Costs cost basket, and *return* on working capital, marketing costs and corporate costs are directly allocated to an Other Costs cost basket.

Costs in the Asset Costs cost basket are allocated to three cost pools. These are a High Pressure (HP) System cost pool, a Medium Pressure/Low Pressure (MP/LP) System cost pool, and a Metering cost pool. The same allocator, Allocator 2 has been used for the three allocations. Allocator 2, replicates the calculation of the *return* on the *capital base* and the calculation of *depreciation*. The values of Allocator 2 are shown in Table 2.2.

Costs in the Operating and Maintenance Costs cost basket are also allocated to the High Pressure System cost pool, the Medium Pressure/Low Pressure System cost pool, and the Metering cost pool. The same allocator, Allocator 1 has been used for each of these allocations. Allocator 1 allocates costs to the cost pools on the basis of replacement value of assets. The values of Allocator 1 are shown in Table 2.2.

Costs in the Other Costs cost basket are not allocated to cost pools. They are not asset-related. They are allocated directly to *reference services* using a weighted average of Allocator 4 and Allocator 7. Allocator 4 allocates costs on the basis of proportion of forecast total volume delivered, and Allocator 7 allocates costs on the basis of proportion of forecast total number of *delivery points*. Allocator 4 and Allocator 7 are given weights of 20.0% and 80.0%, respectively, in the allocation of costs in the Other Costs cost basket to *reference services*. The values of Allocators 4 and 7 are shown in Table 2.2.

Costs in each of the cost pools have been allocated to the *reference services*. High Pressure System costs have been allocated to *Reference Service A* and to *Reference Services B1*, *B2* and *B3* on the basis of estimated contribution to system peak flow. These contributions (Allocator 3) are shown in Table 2.2. Medium Pressure/Low Pressure System costs have been allocated to *reference services* using Allocator 6. Allocator 6 reflects use of *AlintaGas Network* assets by weighting the forecast volumes of gas delivered for *users* requiring each of the *reference services* by estimates of the corresponding average load factors. These load factor weighted volumes (as proportions of their total) are shown in Table 2.2.

The final stage of cost allocation is the allocation of *reference service* costs to *reference tariffs*. These allocations are shown in Figure 2.2.

Reference Service A costs are allocated to the standing, demand and usage charges of *Reference Tariff A* in the ratio 30.0% : 35.0% : 35.0%. The costs being allocated are, predominantly, High Pressure System costs. (These costs were allocated in the ratio 60.0% : 40.0% to demand and usage charges in tariff construction under the previous access regime of the *Gas Corporation Act 1994* and the *Gas Distribution Regulations 1996*.)

Allocators 4, 5, and 8 were used to allocate the costs of *Reference Services B1*, *B2* and *B3* to the corresponding *reference tariffs*.

Allocator 5 allocates High Pressure System costs allocated to *Reference Services B1*, *B2* and *B3* to the corresponding *reference tariffs* on the basis of forecast gas volumes (excluding volumes deriving from *users* requiring *Reference Service A*). The values of Allocator 5 are shown in Table 2.2.

Allocator 8 is used for the allocation of Metering costs. It has been calculated by weighting the number of *delivery points* for each of the *reference services* for which *standard delivery facilities* are provided by the estimated cost of the *standard delivery facilities* for that category of *service*. The values of Allocator 8 are shown in Table 2.2.

Table 2.2
Cost allocators

Allocator 1: replacement value of assets	
High Pressure System	17.3%
Medium Pressure/Low Pressure System	51.5%
Metering	31.2%
Allocator 2: capital-related cost (return plus depreciation)	
High Pressure System	21.0%
Medium Pressure/Low Pressure System	60.6%
Metering	18.4%
Allocator 3: contribution to system peak flow	
Reference Service A	35.0%
Reference Services B1, B2 and B3	65.0%
Allocator 4: volume delivered	
Reference Service A	55.3%
Reference Service B1	13.2%
Reference Service B2	3.2%
Reference Service B3	28.3%
Allocator 5: volume delivered (excluding Reference Service A volume)	
Reference Service B1	29.6%
Reference Service B2	7.2%
Reference Service B3	63.2%
Allocator 6: load factor weighted volume	
Reference Service A	1.9%
Reference Service B1	22.9%
Reference Service B2	6.7%
Reference Service B3	68.5%
Allocator 7: number of delivery points	
Reference Service A	0.01%
Reference Service B1	0.09%
Reference Service B2	0.90%
Reference Service B3	99.00%
Allocator 8: cost weighted number of delivery points	
Reference Service B2	3.6%
Reference Service B3	96.4%

Figure 2.1
Cost Allocation (1)

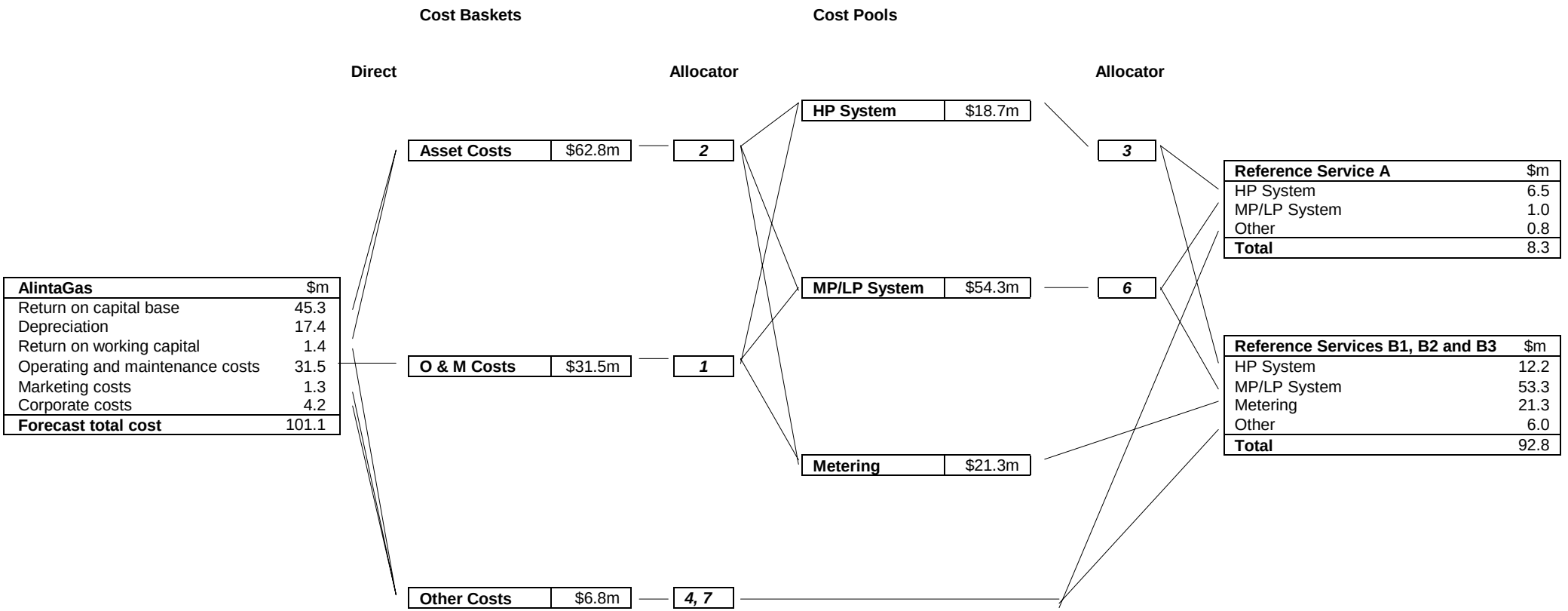
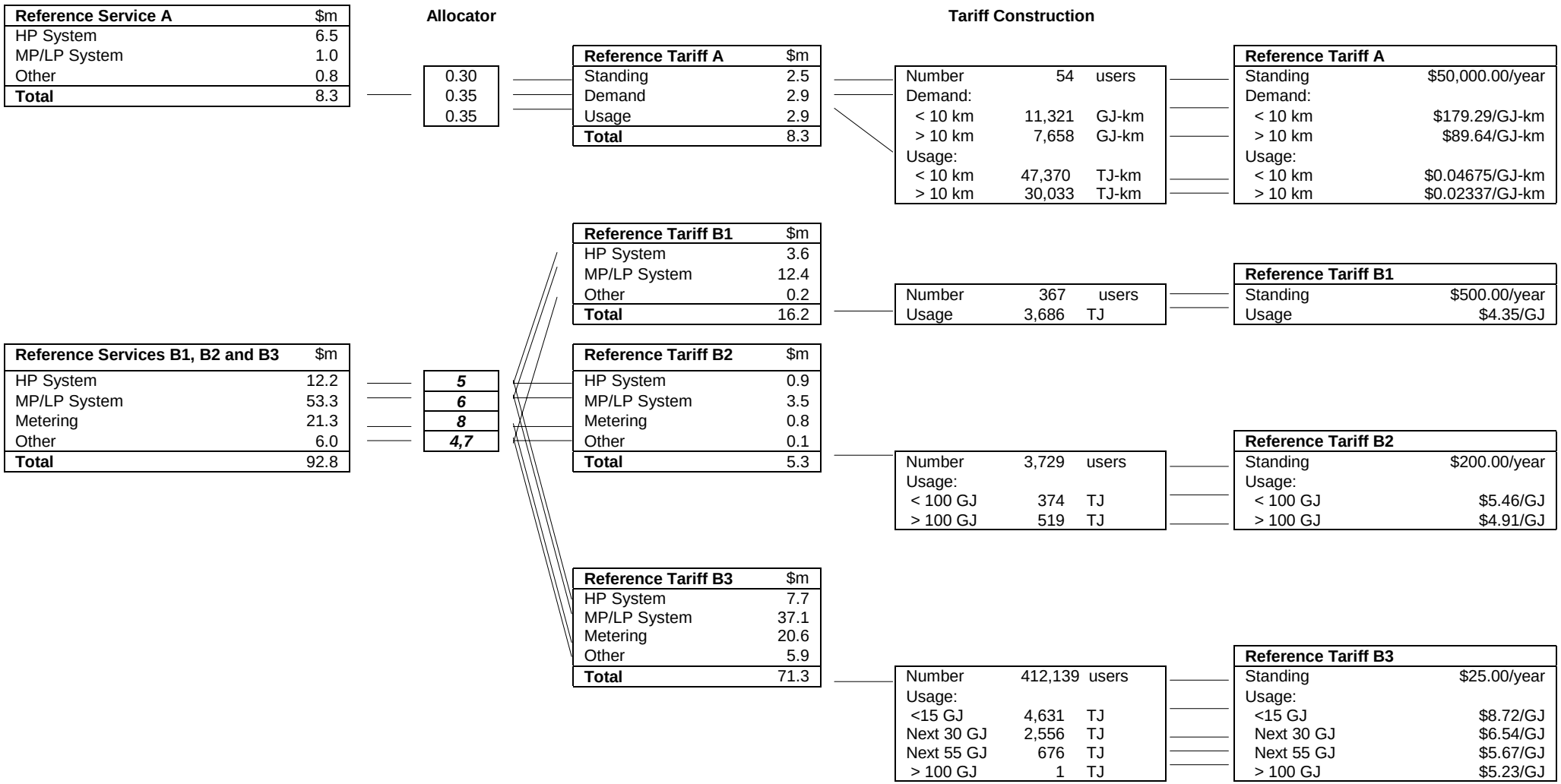


Figure 2.2
Cost Allocation (2)



2.6 Reference tariffs

The *reference tariffs* determined in accordance with the policies described in the preceding subsections of this *Access Arrangement Information* are summarised in Table 2.3.

Table 2.3
Reference Tariffs

Tariff	Standing Charge	Block Structure	Demand Charge	Usage Charge
	$/year		**$/GJ-km/year**	**$/GJ-km**
A	50,000.00	First 10 km	179.29	0.04675
		> 10 km	89.64	0.02337
				$/GJ
B1	500.00	n.a.*	n.a.	4.35
B2	200.00	First 100 GJ	n.a.	5.46
		> 100 GJ	n.a.	4.91
B3	25.00	First 15 GJ	n.a.	8.72
		Next 30 GJ	n.a.	6.54
		Next 55 GJ	n.a.	5.67
		> 100 GJ	n.a.	5.23

* n.a. = not applicable

2.7 Incentive structure

The *reference tariff principles* of section 8 of the *Code* permit the setting of *reference tariffs* for the first year of the *Access Arrangement*, and adjustment of those tariffs in subsequent years. The approach to future tariff adjustment is referred to as the form of regulation. The form of regulation may be:

- tariff adjustment in accordance with a pre-determined price path; or
- tariff adjustment on the basis of actual outcomes (such as sales volumes and actual cost) in subsequent years; or
- tariff adjustment in accordance with a variation or combination of these two approaches.

The *Reference Tariff Policy* set out in the *Access Arrangement* provides for tariff adjustment in accordance with a pre-determined price path.

The method by which the *reference tariffs* are to be adjusted in each year of the *Access Arrangement* after the first is set out in Schedule 2 of the *Access Arrangement*.

Schedule 2 defines an average revenue, or revenue yield, control on *reference tariffs*. In each year of the *Access Arrangement* after the first, *AlintaGas* may, subject to the *Regulator* being advised of the proposed changes, vary its *reference tariffs*, provided the variation is such that forecast average revenue for the year (the *review year*) does not exceed the maximum allowed average revenue for that year.

Schedule 2 establishes a procedure for calculating the maximum allowed average revenue (per GJ of gas delivered to *users* requiring the *reference services*) for each year of the *Access Arrangement* after the first. If certain adjustments (described in the paragraphs that follow) are not required, the maximum allowed average revenue in the second year of the *Access Arrangement* is the average revenue (per GJ of gas delivered) in the first year increased by *CPI - X*, where *CPI* is the year-on-year increase in the Consumer Price Index (as defined in Schedule 2), and *X* is a specified productivity improvement factor. For *review years* after the second year of the *Access Arrangement* (and provided the adjustments described below are not required), the maximum allowed average revenue is its value in the preceding year increased by *CPI - X*. The value of *X* is set prior to commencement of the *Access Arrangement* (in the process of determining the *Initial Reference Tariffs*) and is not varied during the *Access Arrangement period*.

Schedule 2 permits two types of adjustments to the maximum allowed average revenue for the second and subsequent years of the *Access Arrangement*. The first is a reweighting of the components of the average in the event of *users*' requirements for *reference services* changing from one year to the next.

The second type of adjustment corrects the total revenue from sale of the *reference services* to the extent that *reference tariffs* in previous years did not maintain *AlintaGas's* average revenue on the *CPI - X* price path. These adjustments are required because changes to *reference tariffs* are proposed, in accordance with Schedule 2, before commencement of the *review year* (at least 30 days, but no more than 6 months, before the start of that year). The proposed changes are to be calculated using forecasts of the sale of *reference services* in the *review year*. At the time *reference tariffs* are to be proposed for the next *review year*, an estimate of revenue from the sale of *reference services* in the current year is available based on at least 6 months of actual sales data for that year. To the extent that *reference tariffs* set for the current year have resulted in average revenue exceeding the maximum allowed average revenue for that year, the excess (adjusted for the time value of money), is returned to *users* through a reduction in the maximum allowed average revenue for the *review year*. Other things being equal, this reduction in maximum allowed average revenue requires a reduction in *reference tariffs* for the *review year*. If *reference tariffs* set for the current year have resulted in average revenue falling below the maximum allowed average revenue for that year, the shortfall (adjusted for the time value of money), is recovered from *users* through an increase in the maximum allowed average revenue for the *review year*. Other things being equal, this increase permits an increase in *reference tariffs*.

The adjustment described in the preceding paragraph has, in fact, two parts. The first is the adjustment required because the estimated (total) revenue for the current

year differs from the (total) revenue expected on the basis of the forecasts used to determine the *reference tariffs* for that year. The second part, similarly calculated, is an adjustment to reflect the fact that when *reference tariffs* are varied for the next *review year*, the (total) revenue which was estimated for the current year, and for which an adjustment was made in setting *reference tariffs* for that year, is now known exactly (that is, as an "actual" not an estimate). The procedure of Schedule 2 further requires a reduction in *reference tariffs* for the *review year* if the (total) revenue recovered in the year preceding the current year exceeded the estimated (total) revenue to be recovered when *reference tariffs* for the current year were set. It also permits an increase in *reference tariffs* for the *review year* if the (total) revenue to have been recovered in the year preceding the current year was less than the estimated (total) revenue to be recovered when *reference tariffs* for the current year were set.

Under an average revenue, or revenue yield, control *AlintaGas* has an incentive to minimise the costs of delivering *reference services*. With average revenue constrained to the *CPI - X* price path, increases in the average cost of delivering the *reference services* reduce profits. Reductions in the average cost of delivering *reference services* increase profits, and these increases in profits are retained at least until the end of the *Access Arrangement period*.

The control on average revenue, the maximum allowed average revenue for the *review year* determined by applying the *CPI - X* constraint to the maximum allowed average revenue for the current year, is set using a forecast of the volume of sales of *reference services*, and a forecast of costs of delivering those *reference services* during the *Access Arrangement Period*. If the forecast of the volume of sales of *reference services* is realised, *AlintaGas* will receive, from its sale of those *services* at the *reference tariffs*, a revenue stream with present value equal to the present value of the forecast costs of delivering the *reference services*. (The present value is determined over the five years of *Access Arrangement period* using *AlintaGas's* pre-tax nominal weighted average cost of capital as the discount rate. The method used to calculate the weighted average cost of capital is set out in subsections 3.7 – 3.10 of this *Access Arrangement Information*.)

If *AlintaGas* is able to sell more than the forecast volume of *reference services*, its revenue from sales will exceed the forecast revenue. To the extent that delivery of the increased volume requires proportionately greater capital expenditure and *non-capital costs*, this is of no benefit to *AlintaGas*. If the increased volume can be delivered without a proportionate increase in cost, *AlintaGas* will benefit during the *Access Arrangement period*.

The average revenue, or revenue yield, control constrains average revenue to a *CPI – X* path while allowing individual *reference tariffs* to be varied in response to cost and market conditions. *AlintaGas* has limited its ability to vary individual *reference tariffs* so as to ensure that *users* of particular *reference services* are not subjected to large tariff increases in the future. Large increases in the *reference tariffs* for some *reference services*, offset by large reductions in the *reference tariffs* for other *reference services*, are precluded by Schedule 2 limiting the increase in

any component of any *reference tariff* to no more than 2 percentage points above the percentage increase in the Consumer Price Index.

3. Information regarding capital costs

3.1 Asset values for each category of asset

AlintaGas has considered the factors set out below in establishing the *capital base* of the *AlintaGas Network* for the purpose of determining *reference tariffs* for *reference services*.

3.1.1 Depreciated actual cost of the AlintaGas Network (Code, section 8.10(a))

AlintaGas established, and considered in setting the *capital base*, the depreciated actual cost of the *AlintaGas Network* at 30 June 1998. The depreciated actual cost, prepared from *AlintaGas's* asset register and other accounting records, was $299.7 million.

An independent auditor's report on the depreciated actual cost of the *AlintaGas Network* was sought from the Auditor General. The Auditor General reported that the value of $299.7 million presented fairly the written down historical value of the distribution system assets at 30 June 1998.

3.1.2 Depreciated optimised replacement cost of the AlintaGas Network (Code, section 8.10(b))

The assets that form the *AlintaGas Network* were valued using the depreciated optimised replacement cost method. The resulting valuation, a valuation at 31 December 1998, comprised:

- a depreciated optimised replacement cost valuation of the pipeline assets of the *AlintaGas Network* existing at 30 June 1998 made for *AlintaGas* by engineering consultants Gutteridge, Haskins and Davey Pty Ltd (GHD);
- a valuation of the non-network assets of the *AlintaGas Network* at 30 June 1998; and
- adjustments taking into account estimates of:
  - the capital cost of additions to the *AlintaGas Network* during the period from 1 July 1998 to 31 December 1998; and
  - accumulated depreciation on both the assets forming the *AlintaGas Network* at 30 June 1998, and the additions to those assets, for the period from 1 July 1998 to 31 December 1998.

Valuation of pipeline assets

GHD's application of the depreciated optimised replacement cost method to valuation of the pipeline assets of the *AlintaGas Network* proceeded through six main steps. These were as follows.

(1) Defining the scope of the valuation

GHD made the following assumptions to define the scope of the depreciated optimised replacement cost valuation.

Gas was delivered into the *AlintaGas Network* from *receipt points* at meter stations on the Dampier to Bunbury Natural Gas Pipeline (the transmission pipeline owned by Epic Energy (WA) Nominees Pty Ltd) at the following locations:

Geraldton (Nangetty Road);
Eneabba;
Muchea;
Della Road, Bullsbrook;
Ellenbrook;
Harrow Street, West Swan;
Caversham;
Welshpool;
Forrestdale;
Russell Road, Wattleup;
Barter Road, Naval Base;
Rockingham;
Pinjarra;
Oakley Road (Pinjarra);
Harvey;
Kemerton; and
Clifton Road, Bunbury.

These were the existing meter station sites at 30 June 1998.

The locations of *delivery points* supplied from the *AlintaGas Network* at 30 June 1998 were taken to be fixed.

The geographical extent of the *AlintaGas Network* was fixed. The valuation is based on a pipe network covering the same geographic area as the network existing at 30 June 1998.

(2) Identification of the assets forming the AlintaGas Network and verification of the data available on those assets

Information on the attributes of the assets forming the *AlintaGas Network*, including information on location, material type, size, length, and date installed, was obtained from *AlintaGas's* Distribution Facilities Information System (DFIS) database. (The DFIS database has subsequently been replaced by a new GIS system.)

Before relying on the information in the DFIS database, GHD carried out the following verifications for selected samples of assets:

- information in the database was checked for consistency with the "as built" drawings for the assets; and
- information in the database was checked for consistency with the facilities actually installed.

(3) Pipeline optimisation

Pipeline optimisation studies required for the depreciated optimised replacement cost valuation of the *AlintaGas Network* were undertaken using Stoner network optimisation software. The Stoner software is used by *AlintaGas* for network planning, and substantial set-up costs were avoided by having *AlintaGas* undertake the optimisation studies acting on instructions from GHD.

The optimisation studies assumed that an optimal network would have sufficient capacity to satisfy current requirements for service, and the expected future growth in those requirements over a period of five years.

Modelling for the optimisation studies proceeded as follows.

- Subnetworks were defined in each of the following areas:

  Geraldton;
  Eneabba;
  Muchea;
  the Perth metropolitan area (including Ellenbrook and Mandurah);
  Pinjarra;
  Harvey;
  Kemerton; and
  Bunbury (including Capel and Busselton).

- A peak hour demand was forecast for each *delivery point* in each of these subnetworks and a subnetwork operating regime was established.

- The Stoner software was run to determine:

  - redundancy (lengths of pipe not required, and unnecessary regulators) in each subnetwork; and
  - the optimal diameters of pipes comprising each subnetwork.

Using the results of the modelling, optimal subnetworks were defined for subsequent costing.

(4) Determination of modern engineering equivalents for the assets forming the optimal subnetworks

The modern engineering equivalent materials and components that would be used to replace the assets forming each of the optimal subnetworks, and accepted good industry practice replacement methods, were identified.
In accordance with accepted good industry practice, the low and medium/low pressure parts of the optimal subnetworks would be replaced with components designed to operate at medium pressure.

(5) Establishing unit replacement costs and determination of optimised replacement value

GHD established a set of unit costs for determination of the cost of replacing each of the optimal subnetworks. These unit replacement costs included:

- design, planning and survey costs;
- materials acquisition, storage and handling costs;
- contract-based construction costs;
- costs of altering other services (for example roads, and water and electricity services);
- supervision and commissioning costs; and
- restoration costs.

GHD's unit costs were established on the assumption of "brownfields" replacement conditions. That is, they were established on the assumption that all existing infrastructure (including roads, footpaths, and water and electricity services) is in place and must be taken into account in the replacement of gas distribution assets.

GHD determined the optimised replacement cost of *AlintaGas's* pipeline network by applying its unit costs to replacement of the assets forming each of the optimal subnetworks using modern engineering equivalent materials and components, and accepted good industry practice replacement methods. In applying the unit costs, adjustments were made to reflect different types of land use, and differences in ground conditions.

(6) Establishing asset lives and remaining lives, and determination of depreciated replacement costs of optimal subnetworks

Estimates of the economic lives of the assets forming the optimal subnetworks, and of the remaining lives of these assets, were made by GHD.

To make these estimates, GHD first established technical lives for the assets after reviewing the engineering literature on pipe materials, seeking *AlintaGas* experience with asset durability, and examining estimates of technical lives used by other gas distribution utilities in Australia.

The economic lives of the assets forming the optimal subnetworks were taken to be their technical lives. There were, in *AlintaGas's* view, no material economic constraints that would require the economic lives of the assets to be less than their technical lives. In particular, gas reserves in Western Australia were expected to be sufficient to allow long lived distribution assets to be utilised over their technical lives.

The estimates of the economic lives of assets made by GHD are set out in subsection 3.2 of this *Access Arrangement Information*. Table 3.4 in subsection 3.2 shows both the estimated economic lives and the average remaining lives of assets. The averages have been determined from the expected remaining lives of the assets forming each of the optimal subnetworks.

The cost of replacing each of the assets forming each of the optimal networks was depreciated on a straight line basis to determine a depreciated optimised replacement cost of assets having the same remaining lives as the existing network assets. The depreciated replacement costs for the optimised subnetworks are summarised in Table 3.1.

Table 3.1
Depreciated replacement cost of optimal subnetworks
30 June 1998

Category of asset	Replacement Cost $m	Optimised Replacement Cost $m	Depreciated Replacement Cost $m
Mains:			
High pressure	192.6	172.2	153.2
Medium pressure	275.4	242.6	206.6
Medium low pressure	175.8	172.3	118.4
Low pressure	61.8	61.8	34.6
Secondary gate stations	3.8	3.4	2.2
Regulators	26.4	11.9	9.0
Meters and service pipes	335.0	335.0	160.2
Telemetry and monitoring systems	2.1	2.1	1.1
Total	1,072.9	1,001.4	685.4

Valuation of non-network assets

Non-network assets, including land and buildings, easements, information systems, plant and equipment, and motor vehicles, were not valued by GHD. They were valued as described below, and the resulting values were added to GHD's depreciated optimised replacement cost valuation of the optimal subnetworks to obtain a depreciated optimised replacement cost of the *AlintaGas Network.*

Property valuers Stanton Hillier Parker (WA) Pty Ltd were appointed to value land and buildings. Buildings were valued at the lower of market value and depreciated replacement value. The valuation obtained, $4.8 million, was a value at January 1999. This figure was taken to be indicative of the value of land and buildings at 31 December 1998.

The Valuer General was appointed to determine a market value for all network easements. The valuation obtained, $1.5 million, was a value at February 1999. This figure was taken to be indicative of the value of easements at 31 December 1998.

AlintaGas has recently upgraded its principal information systems, and the assets have not been revalued for the purpose of determining a depreciated optimised replacement cost valuation of the *AlintaGas Network.* The value for information system assets included in the depreciated optimised replacement cost valuation of the *AlintaGas Network* is the written down value at 30 June 1998, adjusted for capital expenditure and depreciation during the period from 1 July 1998 to 31 December 1998.

Individual valuations were not made for the remainder of the non-network assets. Their written down value at 30 June 1998 was taken to be indicative of their depreciated optimised replacement cost value at 31 December 1998.

Depreciated optimised replacement cost valuation

The valuation made by applying the depreciated optimised replacement cost method to the assets which form the *AlintaGas Network* is summarised in Table 3.2.

Table 3.2
Depreciated optimised replacement cost valuation of the AlintaGas Network 31 December 1998

Category of asset	**$m**
Depreciated replacement cost of optimal subnetworks at 30 June 1998	685.4
Value of non-network assets at 30 June 1998	22.7
Additions to the *AlintaGas Network* (pipeline and non-network assets) from 1 July 1998 to 31 December 1998	12.1
	720.2
Less: Depreciation from 1 July 1998 to 31 December 1998	13.2
Depreciated optimised replacement cost of AlintaGas Network	707.0

3.1.3 Application of other recognised asset valuation methods (Code, section 8.10(c))

Section 8.10 of the *Code* sets out factors that should be considered in establishing the *capital base* when *reference tariffs* are first proposed for *reference services* provided by a covered pipeline. These factors include the depreciated actual cost of the covered pipeline, and its depreciated optimised replacement cost. They also include the value that would result from applying other well recognised valuation methods in valuing the covered pipeline.

Further guidance is provided by section 8.11. The initial *capital base* of a covered pipeline that was in existence prior to commencement of the *Code* normally should be a value in the range from depreciated actual cost to depreciated optimised replacement cost.

Beyond this, the *Code* is not prescriptive about the *capital base*.

Consideration has therefore been given - as the *Code* intends - to the use of other recognised asset valuation methods in establishing the capital base of the *AlintaGas Network*. In particular, consideration has been given to establishing its *capital base* using a deprival value method of asset valuation.

The deprival value of an asset is the value of the future economic benefits that a service provider would forego if it were deprived of the asset.

If the purpose of asset valuation is the determination of prices for services provided by a monopoly asset, a deprival value method may not be immediately applicable. The future economic benefits foregone if the service provider were deprived of the asset may be difficult to estimate because prices for the services provided are not available.

In the context of valuing the assets that form the *AlintaGas Network*, this circularity arising in the use of deprival value methods can be overcome by:

- assuming prices in the retail sector of the gas market cannot be significantly increased through the process of setting distribution *reference tariffs*; and
- estimating the structure of costs (costs of gas, gas transmission, and retail operations) and margins in the retail sector.

With fixed prices in the retail sector, and a known structure of costs and margins, upper limits are placed on *reference tariffs* for distribution *reference services*. These upper limits become the "prices" required for estimating the future economic benefits foregone if *AlintaGas* were deprived of its distribution network.

To establish the *capital base* of the *AlintaGas Network*, and *reference tariffs* for *reference services*, the values of the assets that form the network have been adjusted downward (from their depreciated optimised replacement cost values). The extent of this downward adjustment has been just sufficient to achieve estimates of prices

in the retail market consistent with the level of prices expected to prevail in that market during the period of the *Access Arrangement*.

The downward adjustment of the asset values has not been uniform. To avoid increases in the retail price payable by residential and small business consumers, relatively larger reductions in the values of the classes of assets used to deliver gas to those consumers have been necessary.

The result of applying this deprival value method in valuing the *AlintaGas Network* is a *capital base* of $530.3 million. The values adopted for each of the categories of assets which form the network are shown in Table 3.3.

Table 3.3
Components of the capital base
31 December 1998

Category of asset	$m
Mains:	
High pressure	142.7
Medium pressure	169.8
Medium low pressure	96.8
Low pressure	28.0
Secondary gate stations	2.0
Regulators	8.9
Meters and service pipes	60.8
Telemetry and monitoring systems	1.0
Equipment and vehicles	14.1
Buildings	1.8
Land	4.4
Total	530.3

3.1.4 Advantages and disadvantages of alternative asset valuation methods (Code, section 8.10(d))

Natural gas pipeline systems are capital intensive and asset values are a major determinant of *reference tariffs*. Valuing pipeline system assets at their depreciated actual costs is relatively simple, with use being made of costs recorded and depreciation calculated using well established and widely understood accounting conventions. Asset valuation, using depreciated actual costs, is relatively free from the subjective assessments which must be made in applying other asset valuation methods.

However, valuing assets at their (depreciated) actual costs ignores the current or market values of those assets. To the extent that asset values based on actual costs are significantly different from these current or market values (which may well be the case for the long lived assets that comprise pipeline systems), *reference tariffs* may not provide the correct signals for *new facilities investment*. Furthermore,

when major new investment is required, users of the assets provided are likely to be faced with significant price increases.

The use of replacement costs as a basis for asset valuation avoids the difficulty of *reference tariffs* not providing the correct signals for *new facilities investment*. It also enables the effects of technological change, and of asset redundancy as a result of changes in gas demand, to be reflected in asset values and, in consequence, in *reference tariffs*. Furthermore, basing *reference tariffs* on the economic cost of providing gas transportation services reduces the likelihood of economically inefficient investment decisions in upstream and downstream industries.

If reference tariffs are based on asset values determined from replacement costs, large increases are likely to be avoided when tariffs are redetermined at the time of *Access Arrangement* review.

Users and gas consumers may, however, face large price increases in the transition from a regime in which gas transportation charges have been based on asset values determined from actual costs, to a regime in which *reference tariffs* are based on asset values determined from replacement costs.

Selecting the depreciated optimised replacement cost as the c*apital base* of the *AlintaGas Network* results in *reference tariffs* which, if implemented, would substantially increase prices in the retail sector of the gas market in the mid-west and south west of Western Australia. *AlintaGas* is of the view that the increases in charges for gas distribution services, and the increases in retail prices, that would result, are likely to be inconsistent with the reasonable expectations of persons under the regulatory regime that applied to the *AlintaGas Network* prior to the commencement of the *Code*.

3.1.5 Initial capital base

After considering the factors noted above, *AlintaGas* has determined that the initial *capital base* of the *AlintaGas Network* at 31 December 1998 should be $530.3 million. This figure, which lies between depreciated actual cost and depreciated optimised replacement cost, is a valuation of the assets that form the *AlintaGas Network* that results from the application of a deprival value approach to valuation.

Of the total $530.4 million, $517.6 million is to be recovered from *users* through those components of the *reference tariffs* that recover the costs incurred in using the *AlintaGas Network.* The remaining $12.7 million is to be recovered, through charges for *user specific delivery facilities*, from *users* requiring *Reference Service A* or *Reference Service B1*.

3.2 Assumptions on economic lives of assets for depreciation

The economic and average remaining lives of the assets forming the *AlintaGas Network* are set out in Table 3.4. These asset lives were used in determining *depreciation*.

Table 3.4
Economic lives of assets
At 30 June 1998

Category of asset	Economic life (years)	Average remaining life (years)
Mains:		
High pressure	120	97
Medium pressure	60	50
Medium low pressure	60	41
Low pressure	60	41
Secondary gate stations	40	26
Regulators	40	40
Meters:		
Residential	25	10
Commercial and industrial	25	14
Telemetry and monitoring systems	10	5
Equipment and vehicles	10	5
Buildings	40	25

3.3 Depreciation

The forecast total cost of providing all *services* by means of the *AlintaGas Network*, determined, in accordance with the *cost of service* method, is the sum of a *return* on the *capital base*, *depreciation* of the *capital base*, and the *non-capital costs*.

Depreciation of the *capital base* is to be determined in accordance with the requirements of section 8.32 of the *Code*.

In accordance with the requirements of that section, *AlintaGas* has determined a depreciation schedule for each group of assets that form the *AlintaGas Network*. The set of depreciation schedules, the Depreciation Schedule, establishes the *depreciation* to be used for the purpose of determining *reference tariffs*.

Depreciation for each group of assets that form the *AlintaGas Network* has been calculated using the Current Cost Accounting (CCA) method. In applying this method, regulatory asset values are adjusted each year to take into account *new facilities investment*, and the depreciation of existing and new facilities, during the year. Depreciation is calculated on a straight line basis on the adjusted regulatory asset values. Assets in each group are depreciated over the assumed economic life of the group. The resulting depreciation is then further adjusted for the change in nominal asset values during the year caused by inflation.

The CCA method is summarised as follows. For each group of assets, in each year of the *Access Arrangement*:

- $RVA_t = RVA_{t-1} + NI_t - DRVA_{t-1} - 0.5 \times DNI_t$

where:

- RVA_t is the regulatory value of assets in the group at the end of year t;
- RVA_{t-1} is the regulatory value of assets in the group at the beginning of year t;
- NI_t is new investment in assets in the group during year t;
- $DRVA_{t-1}$ is the straight line depreciation of the regulatory value of the assets in the group at the beginning of year t;
- DNI_t is the straight line depreciation of the new investment in assets in the group during year t; and
- only 50% of any new investment during year t is treated as depreciable during that year.

- $DRVA_t = DR \times RVA_{t-1}$

  $DNI_t = DR \times NI_t$

  where DR is the depreciation rate for the assets in the group;

- $CCAD_t = (DRVA_t + DNI_t) \times (1 + \pi_e)$

  where $CCAD_t$ is the CCA depreciation on the assets in the group during year t, and π_e is the expected rate of inflation.

The *Depreciation Schedule* is set out in Table 3.5, and the calculations are summarised in Table 3.6.

Table 3.5
Depreciation Schedule: Current Cost Accounting method
Year ending 31 December

Asset group	**1999 $m**	**2000 $m**	**2001 $m**	**2002 $m**	**2003 $m**	**2004 $m**
Mains:						
High pressure	1.4	1.5	1.5	1.6	1.7	1.7
Medium pressure	3.5	3.7	3.8	4.0	4.2	4.4
Medium low pressure	2.4	2.5	2.5	2.6	2.7	2.7
Low pressure	0.9	0.9	1.0	1.0	1.1	1.2
Secondary gate stations	0.1	0.1	0.1	0.1	0.1	0.1
Regulators	0.3	0.4	0.4	0.4	0.4	0.4
Meters and service pipes	4.6	5.0	5.6	6.1	6.5	7.0
Equipment and vehicles	2.7	3.2	3.8	4.1	4.4	4.8
Buildings	0.1	0.1	0.1	0.1	0.1	0.1
Total	16.0	17.4	18.8	20.0	21.2	22.4

Table 3.6
Depreciation of the capital base: Current Cost Accounting method
Year ending 31 December

	1999 $m	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Regulatory asset values:						
Opening asset value	517.6	526.5	536.7	540.5	541.8	543.8
Capital expenditure	24.6	26.8	21.4	19.4	21.0	18.6
Straight line depreciation:						
Initial assets	15.2	15.2	15.2	15.2	15.2	15.2
Capital expenditure	0.4	1.4	2.3	2.9	3.6	4.3
Total depreciation	15.6	16.6	17.6	18.2	18.9	19.6
Closing asset value	526.5	536.7	540.5	541.8	543.8	542.7
Expected inflation (cumulative)	1.025	1.051	1.077	1.104	1.131	1.160
CCA depreciation:						
Initial assets	15.6	16.0	16.4	16.8	17.2	17.7
Capital expenditure	0.4	1.4	2.4	3.2	4.0	4.7
Total depreciation	16.0	17.4	18.8	20.0	21.2	22.4

3.4 Return on the capital base

Consistency in the determination of the forecast cost of providing all *services* by means of the *AlintaGas Network* in accordance with the *cost of service* method requires use of a CCA method in determining the *return* on the *capital base* when *depreciation* is determined using the CCA method.

The *return* on each group of assets that form the *AlintaGas Network* has been calculated by applying a pre-tax real rate of return (weighted average cost of capital; see subsection 3.7 below) to the CCA value of that group of assets at the beginning of each year. The CCA value of each group of assets in year t of the *Access Arrangement* is determined by:

- adjusting the regulatory value of the assets in the group for the cumulative change in nominal asset values during the period from 1 January 2000 to year t caused by inflation;
- adding 50% of the new investment in year t; and
- subtracting the accumulated CCA depreciation to the beginning of year t.

The calculations are summarised in Table 3.7.

Table 3.7
Return on capital base: Current Cost Accounting method
Year ending 31 December

	1999 $m	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
CCA return:						
CCA value of initial assets	530.5	543.8	557.4	571.3	585.6	600.2
CCA depreciation accumulated to start of year		16.0	32.8	50.5	69.0	88.4
CCA cost base	530.5	527.8	524.6	520.8	516.6	511.8
Additions to CCA value of assets	12.6	26.6	38.3	49.2	61.2	72.2
CCA depreciation accumulated to start of year:		0.4	1.5	3.0	4.9	7.4
Additions to cost base	12.6	26.2	36.8	46.2	56.3	64.8
CCA return on:						
CCA cost base	42.4	42.2	42.0	41.7	41.3	40.9
Additions to cost base	1.0	3.1	5.0	6.6	8.2	9.6
Return on capital base	43.4	45.3	47.0	48.3	49.5	50.7

The resulting stream of capital-related revenue has the important property that the sum of the present value of the CCA depreciation, CCA return, and CCA residual value at the end of the *Access Arrangement period* calculated using the pre-tax nominal weighted average cost of capital (see subsection 3.7 below) is equal to the regulatory value of the assets at the beginning of the *Access Arrangement period* plus the present value (at the pre-tax nominal weighted average cost of capital) of the *new facilities investment* during the *Access Arrangement Period.*

Table 3.8
Validation of the Current Cost Accounting method

	1999 $m	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Opening asset value	517.6					
First 50% of capital expenditure	12.3	13.4	10.7	9.7	10.5	9.3
Remainder of capital expenditure	12.3	13.4	10.7	9.7	10.5	9.3
Present value (at 10.70%)	618.1					
CCA depreciation	16.0	17.4	18.9	20.0	21.3	22.5
CCA return	43.3	45.3	47.0	48.3	49.5	50.6
CCA residual value						619.9
Present value (at 10.70%)	618.1					

3.5 Committed capital works and capital investment

Section 8.20 of the *Code* permits forecast capital expenditure on new facilities to be taken into account in determining *reference tariffs*, provided that expenditure is

reasonably expected to pass the requirements in section 8.16 when the *new facilities investment* is forecast to occur.

AlintaGas's forecast capital expenditure on new facilities taken into account in determining *reference tariffs* is summarised in Table 3.9.

Table 3.9
Forecast capital expenditure
Year ending 31 December

Category of asset	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Gate stations	0.6				
Mains:					
High pressure	3.3	3.5	2.8	2.6	2.0
Medium pressure	5.2	4.7	4.4	4.6	4.7
Medium low pressure	0.1				
Low pressure	2.2	2.5	2.5	2.7	2.7
Regulators	0.2	0.2	0.4	0.2	0.1
Meters and service pipes	8.2	7.8	7.8	7.6	7.5
Telemetry and monitoring systems	0.1	0.1	0.1	0.3	0.1
Equipment and vehicles	6.8	2.5	1.3	2.8	1.3
Buildings	0.1	0.1	0.1	0.1	0.1
Total	26.8	21.4	19.5	20.9	18.5

3.6 Description of nature of and justification for planned capital investment

3.6.1 Nature of planned new facilities investment

The planned *new facilities investment* shown in Table 3.9 comprises:

- investment required to maintain the safety and integrity of the *AlintaGas Network*, to maintain service levels, and to comply with regulatory requirements; and
- investment to extend the network to meet new *user* demand.

The main items of *new facilities investment* are shown in Table 3.10.

Table 3.10
Forecast capital expenditure: by type of investment
Year ending 31 December

Type of investment	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
High pressure mains	4.0	3.6	3.0	2.6	2.0
Medium/low pressure mains:					
Capacity reinforcement	0.3	0.1	0.2	0.2	0.1
Infill	1.1	0.5			
Relaying program	2.2	2.5	2.5	2.7	2.8
Mains extensions	4.0	4.2	4.5	4.6	4.7
Meters and service pipes	8.2	7.8	7.8	7.6	7.5
Telemetry and monitoring systems	0.1	0.1	0.1	0.3	0.1
Equipment and vehicles:					
Information systems	3.8	1.4	0.5	1.6	0.6
Vehicles, plant and equipment	3.0	1.1	0.9	1.2	0.7
Buildings	0.1	0.1	0.1	0.1	0.1
Total	26.8	21.4	19.5	20.9	18.5

The main items of *new facilities investment* include the following.

- High pressure mains

  Investment in expansion of the *capacity* of the *High Pressure System* to accommodate the forecast growth in volumes of gas to be delivered to *users* during the *Access Arrangement period.*

- Medium/low pressure mains

  Investment in this category has two principal components:

  - investment in expansion of the *capacity* of the *Medium Pressure/Low Pressure System*, including further investment in a program of mains infill, to accommodate the forecast growth in volumes of gas to be delivered to *users* and to maintain system integrity during the *Access Arrangement period*; and
  - continuation of a program for replacement of cast iron and older steel pipes in the *AlintaGas Network.*

  The replacement of all major cast iron pipes is expected to be completed in 2002. The pipe relaying program will then continue in future years with the replacement of older steel mains and service pipes.

- Telemetry and monitoring systems

  Investment in this category is in new and replacement computing and communications equipment specifically for the monitoring and control of the *AlintaGas Network*.

- Equipment and vehicles

  The principal components of investment in this category are:

  - expenditure on information systems including a Customer Information System (CIS Open Vision) for the management of all meter information and meter readings, and a version upgrade of existing SAP business software, and expenditure on the replacement and upgrading of computing infrastructure; and
  - replacement of motor vehicles and other items of plant and equipment.

- Buildings

  Investment in the replacement and upgrading of buildings and accommodation.

- Mains extensions and meters and service pipes to meet new demand

  Investment in this category is in mains, meters and service pipes specifically to provide new *delivery points* on the *AlintaGas Network* for the delivery of gas to new and existing *users*.

3.6.2 Justification of new facilities investment

The planned *new facilities investment* described in subsection 3.6.1 has been taken into account in the determination of the *reference tariffs* for the following reasons:

- the capital expenditures are forecast to occur within the period of the *Access Arrangement*, and the forecasts represent best estimates of expenditure arrived at on a reasonable basis;
- the amounts included are only the amounts that would be invested by a prudent service provider, acting efficiently, in accordance with good industry practise and to achieve the lowest sustainable cost of delivering services; and
- the investment is reasonably expected to pass the requirements of section 8.16 of the *Code* when the capital expenditures are forecast to occur.

Gutteridge Haskins and Davey Pty Ltd (GHD) were appointed to undertake an independent review of forecast capital expenditure with a view to establishing that the *new facilities investment* met the requirements of the *Code*. Their review found that the planned investment in the *AlintaGas Network* described in the preceding subsection of this *Access Arrangement Information* met the requirements of section 8.16.

3.7 Rates of return - on equity and on debt

The forecast cost of providing all *services* by means of the *AlintaGas Network* is determined, in accordance with the *cost of service* method, as the sum of a *return* on the *capital base*, *depreciation*, and the *non-capital costs*.

As described in subsection 3.4 of this *Access Arrangement Information*, the *return* on the *capital base* in each year of the *Access Arrangement* is the product of the *rate of return* and the CCA cost base (adjusted for additions) for that year. *AlintaGas* has used, as the *rate of return* to be applied to the cost base a weighted average of the returns applicable to the equity and debt used to finance the assets which form the *AlintaGas Network.*

The returns applicable to the equity and debt used to finance the assets which form the *AlintaGas Network* are weighted in accordance with the following formula:

$$\text{WACC} = \frac{\text{E}}{\text{V}} \times \text{K}_\text{e} + \frac{\text{D}}{\text{V}} \times \text{K}_\text{d}\,.$$

WACC is the weighted average cost of capital. E and D are, respectively, the market values of the equity and debt used to finance the assets which form the *AlintaGas Network*, and V is the sum of E and D. K_e is the return applicable to equity, and K_d is the return applicable to debt.

K_e and K_d can be estimated from capital market data using the Capital Asset Pricing Model:

$$\text{K}_\text{e} = \text{R}_\text{f} + \beta_\text{e} \times \text{MRP}$$
$$\text{K}_\text{d} = \text{R}_\text{f} + \beta_\text{d} \times \text{MRP}$$

R_f is a risk free rate of return, β_e is the equity beta, β_d is the debt beta, and MRP is the equity market risk premium.

The data used to estimate K_e are post-tax nominal values, and therefore K_e is a post-tax value. Pre-tax nominal values are used to estimate K_d, and the resulting pre-tax nominal K_d is converted into a post-tax nominal value for the purpose of calculating a post-tax nominal WACC:

$$\text{Post - tax nominal K}_\text{d} = \frac{\text{Pre – tax nominal K}_\text{d}}{1 - \text{T}(1 - \gamma)}\,.$$

γ is the value attributed by investors to each dollar of franking credit, and T is the statutory corporate tax rate.

The post-tax nominal WACC is then:

$$\text{Post} - \text{tax nominal WACC} = K_e \times \frac{E}{V} + \text{Post} - \text{tax nominal } K_d \times \frac{D}{V}$$

This post-tax nominal WACC must be converted into a pre-tax real WACC for application to a CCA cost base (adjusted for additions) for the purpose of determining *reference tariffs*. The conversion is carried out in two steps:

- the post-tax nominal WACC is first converted into a pre-tax nominal WACC by dividing it by the imputation adjusted corporate tax rate:

  $$\text{Pre - tax nominal WACC} = \frac{\text{Post - tax nominal WACC}}{1 - T(1 - \gamma)}; \text{ and}$$

- the pre-tax nominal WACC is then converted into a pre-tax real WACC using the following equation:

  $$\text{Pre - tax real WACC} = \left[\frac{1 + \text{Pre - tax nominal WACC}}{1 + \pi_e}\right] - 1$$

  where π_e is the expected rate of inflation.

The determination of the WACC to be used as the *rate of return* for calculation of the *return* on the *capital base* is summarised in Table 3.11.

WACC determination requires expert knowledge of corporate financial theory and the operation of capital markets. Determination of a WACC for the business unit within *AlintaGas* responsible for provision of *reference services* using the *AlintaGas Network* has been undertaken by KPMG Corporate Finance.

Table 3.11
Estimation of the rate of return

Return parameter		Range	Value used to determine Rate of Return
Risk free rate of return	R_f	5.20% - 5.90%	5.65%
Market risk premium	MRP	6.0% - 7.0%	6.5%
Equity beta	β_e	0.77 - 1.01	0.85
Debt beta	β_d	0.23 - 0.24	0.235
Corporate tax rate	T	36%	36%
Franking credit value	γ	0.20 - 0.40	0.30
Debt to total assets ratio	D/V	50% - 60%	55%
Equity to total assets ratio	E/V	40% - 50%	45%
Pre-tax cost of debt	K_d	6.6% - 7.6%	7.2%
Post-tax cost of debt	$K_d(1 - T(1 - \gamma)$	4.7% - 5.9%	5.4%
Post-tax cost of equity	$R_f + \beta_e$ x MRP	9.8% - 13.0%	11.2%
Expected inflation	π_e	2.5%	2.5%
Post-tax nominal WACC		7.25%- 8.75%	8.0%
Pre-tax nominal WACC		10.7% - 11.2%	10.7%
Pre-tax real WACC		7.5% - 8.5%	8.0%

3.8 Capital structure - debt/equity split assumed

Section 8.31 of the *Code* provides guidance on how the returns applicable to the equity and debt used to finance the assets which form the *AlintaGas Network* are to be weighted in determining the *rate of return*:

> *In general, the weighted average of the return on funds should be calculated by reference to a financing structure that reflects standard industry structures for a going concern and best practice.*

A de facto standard for the financing structure of going concerns in the electricity and gas industries is emerging in Australia. That standard is a financing structure comprising between 50% and 60% debt has been assumed for determination of weighted average costs of capital to be used in the setting of access prices for:

- the Access Arrangement submitted by AGL Gas Networks Limited to the Independent Pricing and Regulatory Tribunal in New South Wales in accordance with the terms of the company's 1997 Access Undertaking;
- the distribution system of Albury Gas Company Limited in New South Wales;
- the distribution system of Great Southern Networks in New South Wales;
- Victoria's gas transmission pipeline system;
- Victorian gas distribution pipeline systems,
- Victoria's electricity transmission system; and
- Victorian electricity distribution systems.

A financing structure comprising 60% debt and 40 % equity was adopted by *AlintaGas* for determination of the weighted average cost of capital used in setting prices under the access regime of the *Gas Corporation Act 1994* and the *Gas Distribution Regulations 1996*.

A number of submissions made to the Australian Competition and Consumer Commission and to the Victorian Office of the Regulator-General, in the course of their public consultations on access to Victoria' gas transmission and distribution systems argued that, financing structures comprising about 50% debt were sustainable longer term. KPMG Corporate Finance subsequently advised that a financing structure comprising 50% - 60% debt was appropriate for *AlintaGas*.

In consequence, a financing structure comprising 55 per cent debt and 45 per cent equity was assumed for determination of the WACC used as the *rate of return* for calculation of the *return* on the *capital base*.

3.9 Equity returns assumed – variables used in derivation

As noted in subsection 3.7, the rate of return on equity used in determining the WACC for the *AlintaGas Network* was calculated using the Capital Asset Pricing Model.

$$K_e = R_f + \beta_e \times MRP,$$

where R_f is a risk free rate of return, β_e is the equity beta, and MRP is the equity market risk premium.

The yield to maturity on Commonwealth Government 10 year Treasury Bonds was used to estimate the risk free rate of return. That rate could be estimated using the yield on 10 year Treasury Bonds at the time of WACC determination, or it could be estimated using an average of past bond yields. An average of past bond yields - the average over the 12 months to 30 November 1998 - was used.

Use of a spot rate to estimate the risk free rate of return is inappropriate for the purpose of determining *reference tariffs* which are to apply (without adjustment in response to changes in costs, including the cost of funds) over the five years of the *Access Arrangement*. An average over 12 months should be sufficiently long to provide an estimate which is indicative of the trend in the risk free rate, without being so long that it is biased by earlier financial market conditions and macroeconomic policy settings.

The risk free rate of return used in calculating a return on equity for the purpose of determining the WACC was 5.65%.

Equity betas must be estimated from market data and, in consequence, are available only for companies listed on a stock exchange. For unlisted entities, like the business unit within *AlintaGas* responsible for provision of *reference services* using the *AlintaGas Network*, equity betas must be estimated from the betas of listed

companies engaged in comparable business activities. Beta estimation therefore involves a degree of subjectivity.

Examination of the equity betas for a sample of comparable listed companies, and the betas estimated for the Victorian gas distributors, indicated a figure in the range of 0.77 to 1.01 for *AlintaGas*. A beta of 0.85 was subsequently used in the calculation of the WACC. This value is consistent with the figure used in determining the WACC for the Victorian gas distributors. However, it could underestimate the true equity beta if the risk of by-pass of the *AlintaGas Network* is greater than the risk of by-pass in Victoria. The impact of by-pass risk on the cost of capital of regulated businesses is not, at the present time well quantified. The limited research available indicates that it could be large.

An equity market risk premium of 6.5% was used in applying the Capital Asset Pricing Model in calculating the return on equity for the purpose of determining the WACC for the *AlintaGas Network*. Financial markets research has produced ranges of possible values for the market risk premium (with different ranges applying for different measures of the risk free rate of return). With the risk free rate of return measured using the 10 year Treasury Bond yield, the estimates of the equity market risk premium are in the range 6% - 7%. The value used for the risk premium is the midpoint of this range.

3.10 Debt costs assumed – variables used in derivation

The rate of return on debt used in determining the WACC has also been calculated by applying the Capital Asset Pricing Model.

KPMG Corporate Finance has estimated a debt beta of in the range 0.23 - 0.24. Using the same estimates for the risk free rate of return and the market risk premium as were used in estimating the rate of return on equity results in a cost of debt in the range 6.6% - 7.6%. Using the mid-points of the ranges of values for the risk free rate of return, the debt beta, and the equity market risk premium yields the return on debt of 7.2% used in the calculation of the WACC.

3.11 Return on working capital

An allowance for a *return* on the working capital employed in providing *reference services* has been included in the forecast total cost from which the *reference tariffs* have been determined. This allowance has been determined by applying the pre-tax nominal WACC to an estimated working capital requirement of $13.0 million in the first year of the *Access Arrangement*.

4. Information regarding operations and maintenance

4.1 Non-capital costs

In providing the *reference services* in each year of the *Access Arrangement*, *AlintaGas* expects to incur the *non-capital costs* shown in Table 4.1.

Table 4.1
Non-capital costs incurred in providing the reference services
Year ending 31 December

	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Wages and salaries	12.1	12.4	12.8	13.2	13.5
Materials and supply	14.4	14.0	14.4	14.4	15.1
Outsourced services	1.5	1.5	1.5	1.6	1.6
Property taxes	0.2	0.2	0.2	0.2	0.2
Marketing	1.3	1.4	1.4	1.4	1.5
Corporate overheads	4.2	3.4	2.9	2.9	2.9
Unaccounted for gas	3.3	3.3	3.4	3.5	3.5
Total	37.0	36.2	36.6	37.2	38.3

Section 8.37 of the *Code* requires that the *non-capital costs* used in *reference tariff* determination be only those costs that would be incurred by a prudent *service provider*, acting efficiently, in accordance with accepted good industry practice, and to achieve the lowest sustainable costs of delivering the *reference services*. *AlintaGas* has, therefore, obtained an independent review of its *non-capital costs* to ensure that they satisfy the requirements of section 8.37. The review was undertaken by the PA Consulting Group.

The costs of providing *listed ancillary services* and other *services* are not included in the forecast *non-capital costs* shown Table 4.1. These costs of providing *listed ancillary services* and other s*ervices* are shown in Table 4.2.

Table 4.2
Non-capital costs incurred in providing listed ancillary and other services
Year ending 31 December

	2000 $m	2001 $m	2002 $m	2003 $m	2004 $m
Listed ancillary services	0.6	0.6	0.6	0.7	0.7
Other services	0.8	0.8	0.8	0.8	0.8
Total	1.4	1.4	1.4	1.5	1.5

4.2 Gas used in operations

The *AlintaGas Network* has no compression and, in consequence, no gas is used in operations. A small amount of gas used during commissioning and maintenance is classed as operational losses and is included in unaccounted for gas.

4.3 Unaccounted for gas

Unaccounted for gas is defined as the difference between the measurement of the quantity of gas delivered into the *AlintaGas Network* in a given period, and the measurement of the quantity of gas delivered from the *AlintaGas Network* during that period. This difference is the total effect of:

- errors in gas measurement;
- operational losses resulting from leakage and third party damage to pipe work, and from the use of gas to "blow down", purge and pressurise during the commissioning of new facilities, and after maintenance;
- system line pack variations; and
- errors in the estimation of volumes of gas delivered from the *AlintaGas Network*.

Measurement errors associated with the more than 416,000 meters at *delivery points*, and operational losses, are the main contributors to unaccounted for gas.

System line pack variations - variations in the total quantity of gas in the *AlintaGas Network* - are the result of pressure variations. These pressure variations are small because the various parts of the network have been designed to operate at pressures that are essentially fixed. System line pack variations are relatively small and make a negligible contribution to unaccounted for gas.

To determine the quantity of unaccounted for gas, the volume of gas delivered from the *AlintaGas Network* in a given period must be estimated. An estimate is required because meters at *delivery points* are not all read simultaneously at the end of the period. Estimation introduces a small error into the volume of gas delivered from the network.

The quantity of unaccounted for gas is likely to fluctuate over short periods of time, principally because of the random nature of gas measurement errors. Over an extended period, a small systematic loss should be observed.

From its experience in operating the *AlintaGas Network*, *AlintaGas* has established that the systematic loss is approximately 3% of the volume of gas delivered from the network.

Users are not required to make any allowance for unaccounted for gas. All of the gas lost as unaccounted for gas is replaced by *AlintaGas*. *AlintaGas* purchases, and transports via the Dampier to Bunbury Natural Gas Pipeline, gas for this purpose. Forecasts of the costs of the gas purchased and transported are included in the *non-capital costs* for recovery through the *reference tariffs*.

Approximately six months after the end of each year of the *Access Arrangement*, after all meters have been read, and after all meter readings have been verified and, if necessary, corrected, *AlintaGas* will determine the volume of unaccounted for gas for the year. If the volume of unaccounted for gas so determined exceeds 3% of the volume of gas delivered during the year, each *user* will be reimbursed for value of the additional gas it has had to supply during the year. All reimbursements will be made at the average price at which *AlintaGas* purchases and transports gas for the purpose of replacing gas that is lost as unaccounted for gas.

If the quantity of unaccounted for gas is less than 3% of the volume of gas delivered, no reconciliation or compensation will be required. *Users* will have had the benefit of gas they did not purchase.

Any reimbursement for unaccounted for gas is a penalty for poor performance by *AlintaGas*. The prospect of penalty is an incentive for *AlintaGas* to reduce the rate at which gas is systematically lost as unaccounted for gas. Any sustained reduction in the rate will ultimately benefit *users* through its lowering of the forecast cost of unaccounted for gas used in the determination of *reference tariffs* at the next review of the *Access Arrangement*.

4.4 Fixed versus variable costs

The *non-capital costs* are fixed costs; they do not vary materially with the throughput of the *AlintaGas Network.*

4.5 Cost allocation between services and categories of asset, and between regulated and unregulated business segments

The allocation of costs between categories of asset and services has been described in subsection 2.5.

5. Information regarding overheads and marketing costs

5.1 Total costs at corporate level

Corporate overheads are allocated to each of the business units within *AlintaGas*, including the business unit responsible for provision of the *reference services* using the *AlintaGas Network*. These overheads include the costs of the board and the chief executive's office, and business services costs. The latter are the costs of centrally provided services including accounting, human resources policy, information technology, legal counsel, risk management and treasury.

Corporate overheads are allocated to each business unit using an established allocation procedure. Forecast total costs at corporate level, and the percentages allocated to provision of the *reference services* using the *AlintaGas Network*, are shown in Table 5.1.

Table 5.1
Total costs at corporate level and overhead allocation
Year ending 31 December

	2000	2001	2002	2003	2004
Total costs at corporate level	$7.5m	$5.9m	$5.1m	$5.2m	$5.3m
Overhead allocation rate	56.1%	57.3%	57.3%	56.4%	55.7%
Allocation to *reference services*	$4.2m	$3.4m	$2.9m	$2.9m	$2.9m

5.2 Allocation of costs between regulated and unregulated business segments

The business unit within *AlintaGas* responsible for provision of the *reference services* using the *AlintaGas Network* is also involved in a number of business activities not the subject of regulation under the *Access Arrangement*. The costs expected to be incurred in carrying out these unregulated activities have been excluded from the forecast of *non-capital costs* incurred in providing the *reference services*.

5.3 Allocation of costs between services and categories of asset

The allocation of overhead and marketing costs between services and categories of assets is part of the overall allocation of costs described in subsection 2.5.

6. Information regarding system capability and volume assumptions

6.1 Description of system capabilities

The *AlintaGas Network* is not a contiguous system of gas distribution pipes and associated facilities, but comprises of a number of discrete segments or subnetworks. At the time of submission of this *Access Arrangement Information* to the *Regulator*, the *AlintaGas Network* comprised approximately 10,125 kilometres of gas distribution pipelines and associated facilities located in the following areas of Western Australia:

Geraldton;
Eneabba;
Muchea;
the Perth metropolitan area (including Ellenbrook, Rockingham and Mandurah);
Pinjarra;
Harvey;
Kemerton;
Bunbury;
Capel; and
Busselton.

Each of these subnetworks has been constructed using similar methods and materials, and each operates under the same pressure regime. Each is supplied with gas from one or more *receipt points* immediately downstream of meter stations on the Dampier to Bunbury Natural Gas Pipeline. These meter stations and *receipt points* are at the following locations:

Nangetty Road (Geraldton);
Eneabba;
Muchea;
Della Road (Bullsbrook);
Ellenbrook;
Harrow Street, West Swan;
Caversham;
Welshpool;
Forrestdale;
Russell Road, Wattleup;
Rockingham;
Oakley Road (Pinjarra);
Harvey;
Kemerton; and
Clifton Road (Bunbury).

Gas delivered into the *AlintaGas Network* is delivered into the *High Pressure System*. The *High Pressure System* comprises all pipelines in the *AlintaGas Network* operating at a nominal pressure greater than or equal to 300 kPa. These pipelines are listed in Table 6.1 and shown in the maps of subsection 6.2 of this *Access Arrangement Information*.

Table 6.1
AlintaGas Network operating pressures

Network segment	Maximum Allowable Operating Pressure (kPa)	Nominal Operating Pressure (kPa)	Minimum Operating Pressure (kPa)
Geraldton lateral	6,900	3,300	2,400
Narngulu high pressure	1,900	1,000	700
Geraldton town high pressure	1,900	800	700
Geraldton town medium pressure	70	40	15
Eneabba lateral	1,900	1,500	700
Muchea lateral	1,900	1,200	700
Perth metropolitan:			
Della Road lateral	6,900	3,000	2,200
Harrow Street lateral	6,900	3,000	2,500
East Perth lateral	5,300	4,000	2,400
Barter Road high pressure	1,900	1,800	700
Class 150 high pressure	1,900	1,800	700
Rockingham h.p. (including Mandurah)	1,900	1,800	700
Fremantle high pressure	600	600	350
Perth city block	200	200	160
Neerabup polyethylene	200	200	60
Ellenbrook polyethylene	200	200	60
Medium pressure	70	40	15
Medium low pressure	7	4	2
Low pressure	3	1.5	1.25
Pinjarra high pressure	700	600	350
Pinjarra medium pressure	70	40	15
Harvey high pressure	1,900	1,800	700
Harvey medium pressure	70	40	15
Kemerton high pressure	1,900	1,000	900
Bunbury high pressure steel	3,300	1,800	700
Bunbury medium pressure	70	40	15
Capel to Busselton polyethylene	500	450	350
Busselton polyethylene	200	200	60

A number of secondary gate stations, at which pressure is reduced and gas flow is metered, are an integral part of the *High Pressure System*. These secondary gate stations are located:

- in the Geraldton area, at Narngulu and Bootenal, and in the town of Geraldton;
- in the Perth metropolitan area, at Wanneroo (Neaves Road), South Caversham, Viveash, Ballajura, Bayswater and East Perth; and
- in the Bunbury-Busselton area, at Capel.

Gas flows from the *High Pressure System* into the *Medium Pressure/Low Pressure System* through approximately 140 high pressure regulator sets. These regulator sets reduce pressure to nominal pressures less than 300 kPa. The *Medium Pressure/Low Pressure System* comprises these high pressure regulator sets together with those pipelines that operate at nominal pressures less than 300 kPa.

The nominal operating pressures of the pipelines that comprise the *Medium Pressure/Low Pressure System* are listed in Table 6.1, and the extent of that system is shown in the maps of subsection 6.2. The nominal operating pressure of a network segment is the pressure (measured at the start of the segment) at which the segment is normally operated. The nominal operating pressure may be less than the segment's maximum allowable operating pressure for a number of reasons including the provision of operating margins for control equipment and load management.

The maximum allowable operating pressure for a network segment shown in Table 6.1 is the maximum pressure at which that network segment may be operated.

Pipelines comprising the *Medium Pressure/Low Pressure System* are constructed predominantly from polyvinyl chloride pipe, although some sections of main have been constructed using polyethylene, steel, galvanised iron or cast iron pipe.

Approximately 330 medium pressure regulator sets reduce pressure within the *Medium Pressure/Low Pressure System* from medium to medium low and low pressures.

Gas is delivered from the mains of both the *High Pressure System* and the *Medium Pressure/Low Pressure System* through service pipes, valves, regulators, and meters, all of which are usually located immediately upstream of *receipt points*. These facilities are integral parts of the *High Pressure* and *Medium Pressure/Low Pressure Systems*, as are the meters and data logging facilities at secondary gate stations, regulator sets and *receipt point* metering. These data logging facilities record gas flows, temperatures and pressures for the monitoring of system operation and performance, and for the billing of users.

The *capacity* of the *AlintaGas Network* - its potential, as currently configured, to deliver a particular *service* between a *receipt point* and a *delivery point* at a point in time - is determined by the minimum pressures at which the various segments of the network operate. These minimum operating pressures are shown in Table 6.1. They are the minimum pressures which must be sustained in the various segments of the network so as to meet *user* delivery requirements under peak load conditions.

If the delivery requirements of a *prospective user* were expected to cause the pressure in a network segment to fall below the minimum operating pressure of that segment, system enhancement would be required before a *service* could be provided to that *prospective user*.

6.2 Maps of the pipeline system

Maps of the *AlintaGas Network*, showing the pipelines comprising the *High Pressure System* at the time of submission of this *Access Arrangement Information* to the *Regulator*, and showing the extent of the *Medium Pressure/Low Pressure System* at that time, are included in this subsection of this *Access Arrangement Information*.

These maps are:

- Natural Gas Reticulation Area, Country Region, Geraldton, dated April 1999;
- Natural Gas Reticulation Area, Country Region, Eneabba, dated April 1999;
- Natural Gas Reticulation Area, Perth Region, North Sheet, dated April 1999;
- Natural Gas Reticulation Area, Perth Region, South Sheet, dated April 1999;
- Natural Gas Reticulation Area, Country Region, Harvey, dated April 1999;
- Natural Gas Reticulation Area, Country Region, Bunbury, dated April 1999; and
- Natural Gas Reticulation Area, Country Region, Busselton, dated April 1999.

6.3 Average daily and peak demands

Table 6.2 shows the current average and peak daily demands for the *AlintaGas Network*, and current maximum hourly demand.

Table 6.2
System average and maximum quantities
1998

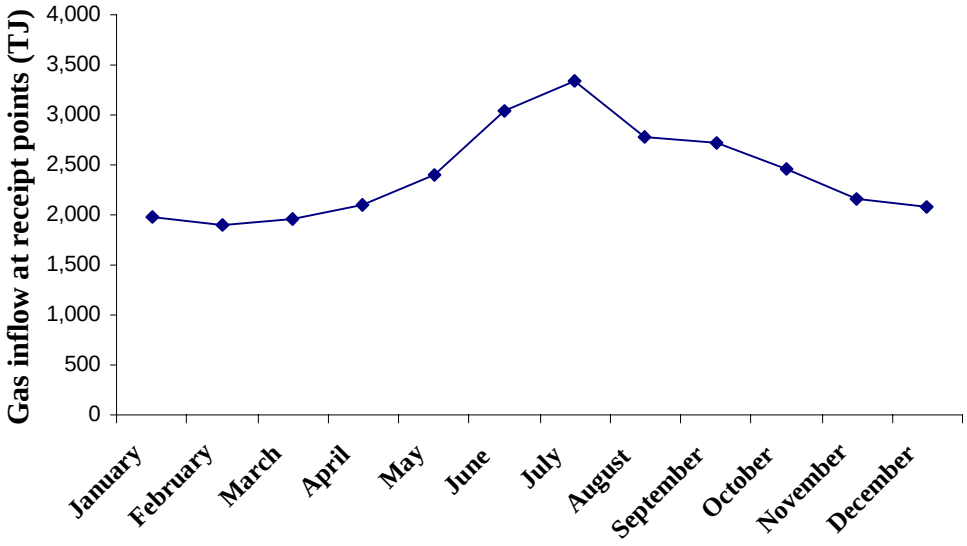
	TJ
Average daily quantity	79.2
Maximum daily quantity	124.3
Maximum hourly quantity	7.8

The load profile of the *AlintaGas Network* is shown in Table 6.3 and Figure 6.1.

Table 6.3
System load profile by month
1998

Month	**Total gas inflow at receipt points (TJ)**
January	1,980.2
February	1,903.7
March	1,954.4
April	2,102.8
May	2,408.9
June	3,040.9
July	3,338.9
August	2,783.9
September	2,710.1
October	2,454.9
November	2,151.4
December	2,086.1
Total	28,916.1

Figure 6.1
System load profile by month
1998



6.4 Annual volume across each service and category of asset

Forecast volumes by service are shown in Table 6.4, and forecast volumes by category of asset are shown in Table 6.5. The forecasts are based on projections made by AlintaGas and independently reviewed by Economics Consulting Services.

Table 6.4
Forecast volumes by service
Year ending 31 December

Service	2000 TJ	2001 TJ	2002 TJ	2003 TJ	2004 TJ
Reference Service A	15,383.8	15,119.8	15,112.6	15,381.8	15,532.0
Reference Service B1	3,686.0	3,637.1	3,649.4	3,728.8	3,780.0
Reference Service B2	891.3	892.6	906.2	933.8	955.6
Reference Service B3	7,863.8	8,134.3	8,408.8	8,678.4	8,940.2
Total - by service	27,824.9	27,783.8	28,077.0	28,722.8	29,207.8

Table 6.5
Forecast volumes by category of asset
Year ending 31 December

Category of asset	2000 TJ	2001 TJ	2002 TJ	2003 TJ	2004 TJ
High pressure:					
Reference Service A	14,894.6	14,639.0	14,632.0	14,892.7	15,038.0
Reference Service B1	653.0	641.8	641.5	652.9	659.3
Medium Pressure/Low Pressure:					
Reference Service A	489.2	480.8	480.6	489.1	493.9
Reference Service B1	3,033.0	2,995.3	3,007.9	3,075.9	3,120.7
Reference Service B2	891.3	892.6	906.2	933.8	955.6
Reference Service B3	7,863.8	8,134.3	8,408.8	8,678.4	8,940.3
Total - by category of asset	27,824.9	27,783.8	28,077.0	28,722.8	29,207.8

6.5 Total number of customers in each pricing zone, service or category of asset

The estimated numbers of *delivery points* at which gas is delivered to *users* are shown in Table 6.6.

Table 6.6
Estimated numbers of Delivery Points
2000

Service	Estimated number of Delivery Points
Reference Service A	54
Reference Service B1	367
Reference Service B2	3,739
Reference Service B3	412,139
Total - by service	416,299

Category of asset	
High pressure:	
Reference Service A	46
Reference Service B1	52
Medium Pressure/Low Pressure:	
Reference Service A	8
Reference Service B1	315
Reference Service B2	3739
Reference Service B3	412,139
Total – by category of asset	416,299

7. Information regarding key performance indicators

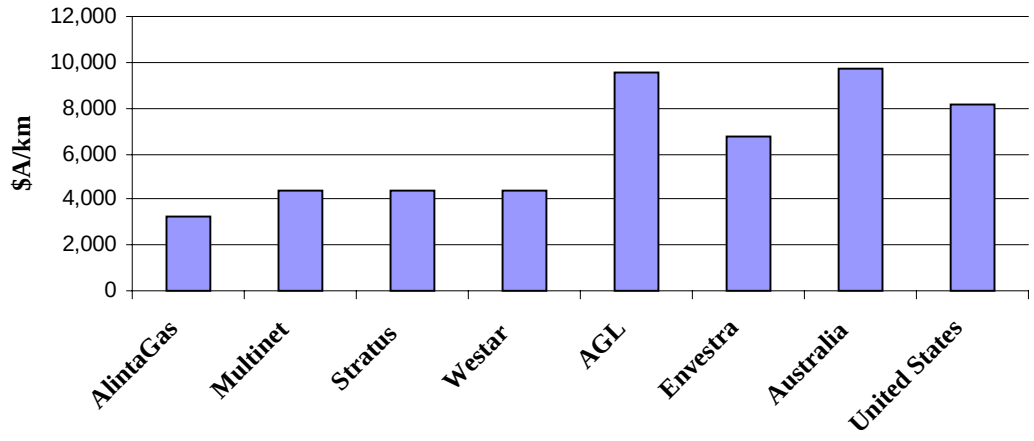
A number of key performance indicators have been used as benchmarks against which the forecast of capital expenditure, and the *non-capital costs*, used in determining the *reference tariffs* have been assessed for reasonableness. They are presented in the following subsections of this section.

These key performance indicators were compiled by the PA Consulting Group as part its review of *non-capital costs*.

7.1 Operating and maintenance cost per kilometre of main

AlintaGas's operating and maintenance cost per kilometre of main compares favourably against that of other gas distribution businesses, both in Australia and in the United States. The comparison is presented graphically in Figure 7.1. Operating and maintenance cost per kilometre of main is probably the most important of the available measures for assessing the reasonableness of non-capital costs because network size is a fundamental cost driver.

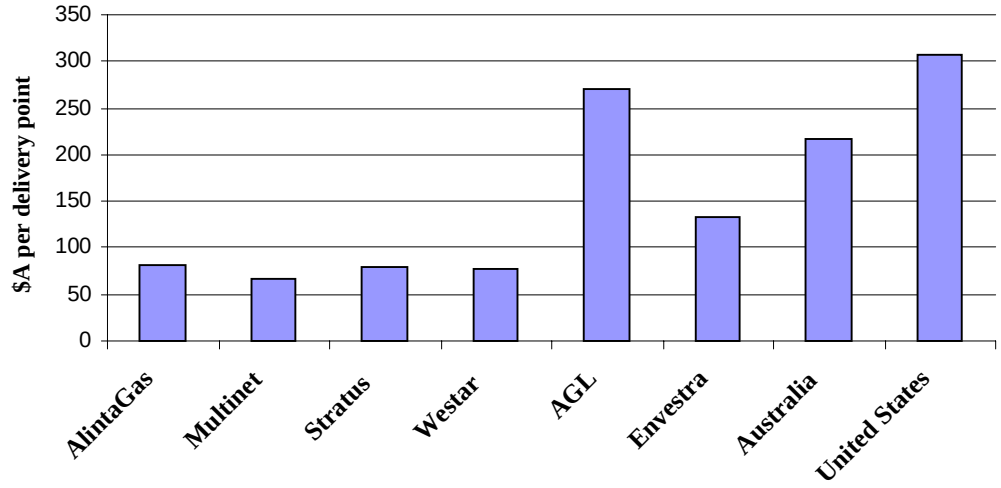
Figure 7.1
Operating and maintenance cost per kilometre of main



7.2 Operating and maintenance cost per delivery point

Operating and maintenance cost per delivery point ranks fourth in the Australian comparisons and well below the national average. This is shown in Figure 7.2.

Figure 7.2
Operating and maintenance cost per delivery point

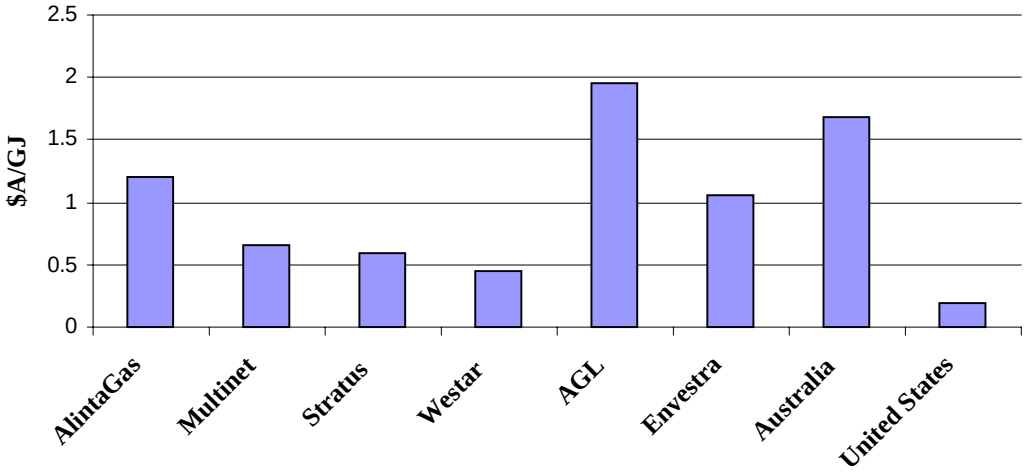


Only the Victorian gas distributors are superior in terms of operating and maintenance cost per delivery point. This is because Melbourne has a higher density of delivery points (the number of delivery points per kilometre of main is higher in Victoria than elsewhere in Australia), and a higher incidence of winter heating, than Perth. Western Australia's mild winters, hot summers and low delivery point density constrain the demand for reticulated natural gas and limit *AlintaGas's* performance on this measure.

7.3 Operating and maintenance costs per GJ delivered

AlintaGas's operating and maintenance cost per GJ delivered is below the national average, and superior for a mild-weather state. This is shown in Figure 7.3.

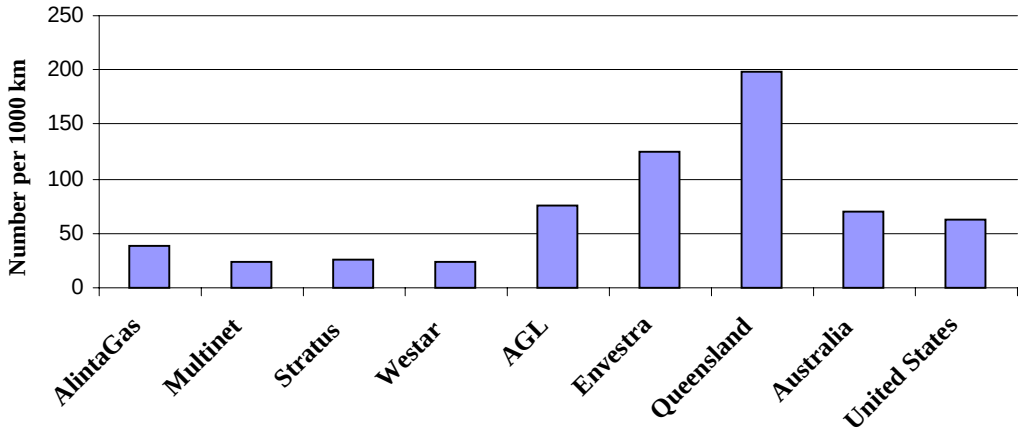
Figure 7.3
Operating and maintenance cost per GJ delivered



7.4 Number of employees per 1000 kilometres of mains

The ratio of employees to assets provides a broad measure of the reasonableness of employee numbers which are, in turn, an important cost driver. *AlintaGas* compares well on this measure, as is shown in Figure 7.4.

Figure 7.4
Number of employees per 1000 kilometres of mains

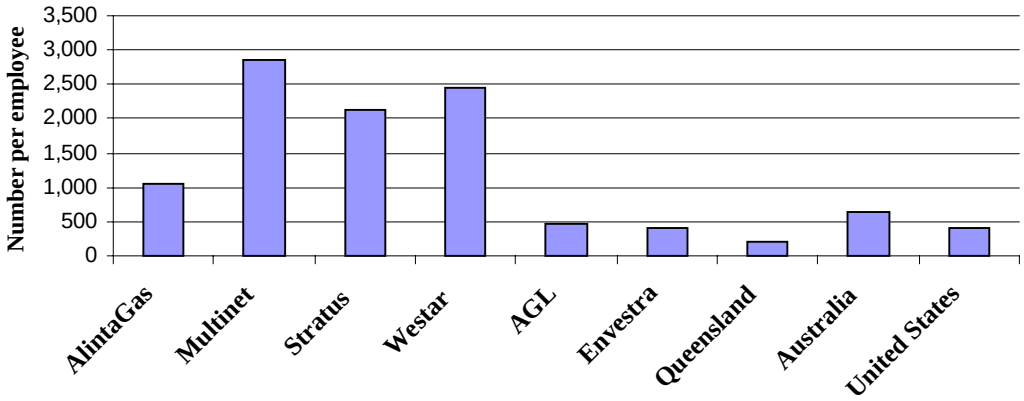


Only the Victorian gas distributors, which have outsourced their maintenance operations (and a number of other functions) have lower numbers of employees per 1000 kilometres of mains. Prior to their outsourcing of maintenance, the Victorian distributors had over 60 employees per 1000 kilometres of mains.

7.5 Number of delivery points per employee

As is shown in Figure 7.5, *AlintaGas* compares favourably against other gas distributors on the basis of number of *delivery points* per employee.

Figure 7.5
Number of delivery points per employee



The number of *delivery points* per employee is influenced by the extent of outsourcing, and by environmental factors driving the use of gas. Both of these factors contribute to the superior performance of the Victorian gas distributors. *AlintaGas* nevertheless compares favourably against other Australian gas distributors, and against gas distributors in the United States.