Proposed Revisions to the Access Arrangement for the WA Gas Networks Gas Distribution Systems

Submission

PUBLIC VERSION

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1 REVISIONS TO THE ACCESS ARRANGEMENT FOR THE WAGN GDS

1.1 Purpose of this submission

An Access Arrangement for the Mid-West and South West Gas Distribution Systems was approved by the Independent Gas Pipelines Access Regulator on 18 July 2000, in accordance with the requirements of the *Gas Pipelines Access (Western Australia) Act 1998*. The 1998 Act gave effect to the *Gas Pipelines Access Law* and the *National Third Party Access Code for Natural Gas Pipeline Systems* (Code) in Western Australia.

On 10 August 2005, the Economic Regulation Authority (ERA) approved revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems which were to apply from 25 August 2005 until the earlier of a date set following a revisions trigger event, and 1 January 2010 (second access arrangement period).

If there were no revisions trigger event, further revisions to the Access Arrangement, to apply from 1 January 2010, were to be submitted to the ERA before 31 March 2009.

In June 2008, the Government of Western Australia introduced legislation into State Parliament which, if it had been passed, would have replaced the *Gas Pipelines Access (Western Australia) Act*, the *Gas Pipelines Access Law*, and the Code with the *National Gas Law* (NGL) and the *National Gas Rules* (NGR). However, the bill lapsed on 7 August 2008 when Parliament was prorogued in advance of an election. Following the election, the new Government reintroduced legislation to implement the NGR and the NGL, but there was uncertainty as to whether the bill (the *National Gas Access (Western Australia) Bill 2008*) would become law before 31 March 2009. In January 2009, WA Gas Networks Pty Ltd (WAGN) asked the ERA to exercise the discretion it had under section 7.19 of the Code, and grant an extension of the time for preparation of revisions to the Access Arrangement for the WAGN GDS. On 12 February, the ERA approved a new Revisions Submission Date of 30 September 2009.

On 1 September 2009, the *National Gas Access (WA) Act 2009* received Royal assent, but only sections 1 and 2 of the Act came into effect. The remaining sections were to come into effect on a day (or days) to be fixed by proclamation. The Office of Energy advised that the remaining sections of the *National Gas Access (WA) Act* would not be proclaimed until the regulations which the Act anticipated had been tabled in Parliament. These regulations would provide for, among other things, the maintenance of uniform gas distribution system tariffs in the South West of Western Australia, and the avoidance of price shock to users of small quantities of gas.

WAGN subsequently applied for a further extension of the Revisions Submission Date to 31 January 2010. The ERA approved the new date on 24 September 2009.

The remaining sections of the *National Gas Access (WA) Act* were proclaimed on 1 January 2010 and, on 29 January 2010, WAGN submitted proposed revisions to the Access Arrangement for the WA Gas Networks Gas Distribution Systems (WAGN GDS) to the ERA.[1] They are for the third access arrangement period, which commences once revisions are approved by the ERA. The proposed revisions were prepared pursuant to the requirements of the NGL and the NGR.

Clause 4 of Schedule 3 to the NGL deems a distribution pipeline which was covered under the scheme of the Code to be a covered pipeline which is a distribution pipeline on commencement of the NGL. The WAGN GDS was covered under the scheme of the Code, and is a covered pipeline for the purposes of the NGL and the NGR.

Section 132 of the NGL requires that a covered pipeline service provider (see section 1.2 below) submit to the ERA, for approval under the NGR, revisions to an access arrangement that is a full access arrangement, in respect of the pipeline services the provider intends to provide.

The proposed revisions required in accordance with section 132 of the NGL are set out in:

- Access Arrangement for the Mid-West and South West Gas Distribution Systems dated 29 January 2010 (Access Arrangement revisions proposal); and
- Access Arrangement Information for the Mid-West and South West Gas Distribution Systems dated 29 January 2010 (revised Access Arrangement Information).

In accordance with the requirements of Rule 48, the Access Arrangement revisions proposal:

- identifies the WAGN GDS (the pipeline to which the Access Arrangement relates) and provides a reference to a website at which a description of the pipeline can be inspected;
- describes the pipeline services WAGN proposes to offer by means of the WAGN GDS;
- specifies the reference services;
- specifies for each reference service the reference tariff; and the other terms and conditions on which the reference service will be provided;
- sets out the capacity trading requirements;

[1] WAGN's proposed revisions to the Access Arrangement include a change of name from Mid-West and South-West Gas Distribution Systems to WA Gas Networks Gas Distribution Systems.

- sets out extension and expansion requirements;
- sets out the terms and conditions for changing receipt and delivery points; and
- sets a new revisions submission date and a new revisions commencement date.

As required by Rule 42, the revised Access Arrangement Information is the information reasonably necessary for users and prospective users to understand:

- the background to the revised Access Arrangement for the WAGN GDS; and
- the basis and derivation of its various elements.

This submission provides further information for the purpose of assisting the ERA with its assessment of the Access Arrangement revisions proposal, and in its making of the access arrangement draft decision required under Rule 59.

1.2 Covered pipeline service provider

Section 132 of the NGL requires that a "covered pipeline service provider must submit . . . revisions to an applicable access arrangement . . . within the time period specified by the Rules".

The definition of "covered pipeline service provider" is set out in section 2 of the NGL and is "a service provider that provides or intends to provide pipeline services by means of a covered pipeline". The definition of "pipeline services" in section 2 of the NGL refers to services such as "haulage services" and "interconnection services" being "provided by means of a "pipeline". The definition of "user" in section 2 of the NGL confirms that the relevant "pipeline services" are those provided under a contract between the "service provider" and a "user".

Section 132, read together with the definitions of "covered pipeline service provider", "pipeline services" and "user" in the context of the regulatory scheme established by the NGL requires a specific type of "service provider" to submit revisions to an access arrangement. The specific type of "service provider" (the "covered pipeline service provider") that is required to submit revisions to access arrangements under the NGL is the entity that provides "pipeline services" to "users" under contract as those are the activities that are subject to price regulation by the ERA.

WAGN owns the WAGN GDS and is the relevant party to all of the contracts under which "pipeline services" are provided to "users". WAGN is the "covered pipeline service provider" for the WAGN GDS.

1.3 Structure of the Access Arrangement

In its proposed revisions, WAGN has made changes to the structure of the Access Arrangement for the WAGN GDS.

During the second access arrangement period, the Access Arrangement comprised three parts:

Part A: Principal Arrangements;

Part B: Reference Tariffs and Reference Tariff Policy; and

Part C: Terms and Conditions.

A reference tariff policy, which was required under the Code, is not required under the regime of the NGL and the NGR. Nevertheless, some elements of the reference tariff policy that was required under the Code are to be included in an access arrangement prepared in accordance with the NGR, and some of the elements are to be included in the access arrangement information.

In these circumstances, there is no requirement for Part B of the Access Arrangement. The policies which WAGN has adopted in developing its proposed revised reference tariffs have been set out in the Access Arrangement itself where this is required by the NGR, or they have been set out in the revised Access Arrangement Information.

The Code required, and the NGR continue to require, that an access arrangement set out the terms and conditions on which the reference services will be provided. There was no requirement under the Code, and there is no requirement in the NGR, for an access arrangement to include a pro forma access contract.

The absence of a pro forma contract has been seen, by some prospective users of the WAGN GDS, as indicating that the terms and conditions set out in the Access Arrangement are only indicative or, in some way, incomplete, and are the subject of further negotiation in settling an access contract with WAGN. These prospective users have sought to change the risk-reward balance that the Access Arrangement achieves in respect of the provision of the reference services, on the specified terms and conditions, at the reference tariffs.

Negotiations with prospective users risk becoming unnecessarily protracted when those users are advised that, by seeking changes, they are no longer seeking the reference services, and the reference tariffs no longer apply.

To better indicate to prospective users that the reference services are those services which are defined by the terms and conditions of the Access Arrangement, to better inform them that the services defined by the terms and conditions are the services which will be made available at the reference tariffs, and to avoid protracted negotiations, WAGN has incorporated the terms and conditions on which it will provide the reference services in a proposed Template Haulage Contract. WAGN anticipates that prospective users would then apply for access to the services provided using the WAGN GDS on the understanding that WAGN would provide the reference services, at the reference tariffs, on the terms and conditions set out in the Template Haulage Contract, which has been the subject of close scrutiny by the ERA in the process of approving the proposed revisions to the Access Arrangement.

The Template Haulage Contract is set out in proposed Annexure B of the Access Arrangement. Proposed Annexure B will replace Part C of the Access Arrangement.

WAGN has proposed, for the third access arrangement period, that the Access Arrangement for the WAGN GDS have the following structure:

1. Introduction;
2. Key dates;
3. Identification of the pipeline;
4. Pipeline services, reference services and reference tariffs;
5. Application procedure;
6. Capacity trading requirements;
7. Extension and expansion requirements;
8. Changing receipt points and delivery points;
9. Depreciation;
10. Speculative capital expenditure account;
11. Fixed principles;
12. Definitions and interpretation;

Annexure A – Calculating haulage tariffs;

Annexure B – Reference tariff variation mechanism;

Annexure C – Template haulage contract.

This structure will replace the existing three-part structure. As will be demonstrated in subsequent parts of this submission, the proposed revised Access Arrangement addresses each of the requirements of Rule 48. Furthermore, the proposed revised

Access Arrangement and the revised Access Arrangement Information will, together, provide all of the information which was provided in the Access Arrangement for the second access arrangement period and in the associated Access Arrangement Information. The division of that information as between the Access Arrangement and the Access Arrangement Information may, however, be different.

1.4 Third access arrangement period

WAGN sought from the ERA an extension of the time within which proposed revisions to the Access Arrangement for the WAGN GDS could be submitted, but did not request a change to the date from which the revisions were to have effect. The Revisions Commencement Date remains 1 January 2010. If approved by the ERA, the proposed revisions will apply from a date fixed in the ERA's final decision or, if no date is so fixed, 10 business days after the final decision (Rule 62(6)). They are then expected to remain in effect until 30 June 2014. In these circumstances, the proposed duration of the third access arrangement period will be 4.5 years.

Although the revisions to the Access Arrangement are expected to commence on 1 January 2010, WAGN is proposing that the reference tariffs prevailing at the end of the second access arrangement period continue, without variation, until 31 December 2010. The operation of Rule 92(3) has been taken into account in proposing revised reference tariffs, which are expected to take effect from 1 January 2011.

The proposed duration of the third access arrangement period is less than the period of five years which is recognised as the norm in Rule 50(1). However, WAGN's adoption of a shorter period is consistent with the national gas objective of section 23 of the NGL, and with the revenue and pricing principles of section 24.

Section 23 of the NGL states:

The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

Section 24 requires, among other things, that the service provider be provided with:

- a reasonable opportunity to recover at least the efficient costs incurred in providing the reference services; and
- effective incentives in order to promote economic efficiency with respect to the reference services which the service provider provides.

A shorter third access arrangement period will bring forward the next revisions to the Access Arrangement for the WAGN GDS, including the next revisions to the reference tariffs. Users and prospective users will, in these circumstances, have the relative certainty of the reference tariffs of the revised Access Arrangement for a period of 4.5 years, and not for 5 years. If there is no revisions trigger event, the next revisions to the reference tariffs will be brought forward by 6 months, with some reduction in the uncertainty which would otherwise surround those revisions. WAGN believes the net effect of this will be insignificant. Its decisions to invest will not be affected, and there will be no impact on the efficient operation of the WAGN GDS. The investment decisions and use of gas by users and prospective users, and by end users, are not expected to be affected. The long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply are also unlikely to be affected by shortening the access arrangement period by 6 months.

WAGN is of the view that shortening the access arrangement period by 6 months will have no effect on its reasonable opportunities to recover at least the efficient costs of providing the reference services using the WAGN GDS.

Nor will it weaken incentives within the scheme of the Access Arrangement for improved efficiency in the provision of the reference services. These incentives are provided by a price control which caps the reference tariffs for the access arrangement period. The price control acts as an effective incentive mechanism because the tariffs are capped for an extended period, that period being the access arrangement period. If, during this period, the service provider can lower its costs, or increase its sales of the reference services, relative to the forecasts of costs and levels of service provision made for determining the reference tariffs, the service provider is able to earn increased profits at least until the end of the access arrangement period. Although WAGN is proposing to shorten the access arrangement period, it is not proposing to change the principle that reference tariffs be capped for a specified period. Reducing the specified period from 5 years to, say, 1 year, would impair the effectiveness of the price control as an incentive mechanism. Reducing the specified period from 5 years to 4.5 years is unlikely to have any impact.

2 REFERENCE SERVICES, NON-REFERENCE SERVICES, AND THE TEMPLATE HAULAGE CONTRACT

2.1 Reference services

WAGN proposes to offer five pipeline services as reference services during the Third Access Arrangement Period. These five pipeline services are as follows.

- Service A1

  Service A1 is a pipeline service under which WAGN delivers gas to a user at a delivery point on the WAGN GDS, where the following preconditions were met at the time the user – then a prospective user – submitted an application for the service:

  - the prospective user is reasonably expected to take delivery of 35 TJ or more of gas during each year of the haulage contract; and
  - the prospective user is reasonably expected to require a contracted peak rate of 10 GJ or more per hour; and
  - the prospective user requests user specific delivery facilities.

  The other terms and conditions on which Service A1 will be provided are set out in the Template Haulage Contract.

- Service A2

  Service A2 is a pipeline service under which WAGN delivers gas to a user at a delivery point on the WAGN GDS, where the following preconditions were met at the time the user – then a prospective user – submitted an application for the service:

  - either the prospective user is reasonably expected to take delivery of 10 TJ or more of gas, but less than 35 TJ of gas, during each year of the haulage contract, and/or is reasonably expected to require a contracted peak rate of less than 10 GJ per hour;
  - an Above 10 TJ Determination was, or was likely to have been, made under the Retail Market Rules; and
  - the prospective user requests user specific delivery facilities.

  The other terms and conditions on which Service A2 will be provided are set out in the Template Haulage Contract.

- Service B1

  Service B1 is a pipeline service under which WAGN delivers gas to a user at a delivery point on the WAGN GDS, where the following preconditions were met at the time the user – then a prospective user – submitted an application for the service:

  - either the prospective user is reasonably expected to take delivery of less than 10 TJ of gas during each year of the haulage contract, and/or is reasonably expected to require a contracted peak rate of less than 10 GJ per hour; and
  - the prospective user requests user specific delivery facilities.

  The other terms and conditions on which Service B1 will be provided are set out in the Template Haulage Contract.

- Service B2

  Service B2 is a pipeline service under which WAGN delivers gas to a user at a delivery point on the medium pressure/low pressure parts of the WAGN GDS using standard delivery facilities which include a standard 12 m^3/hr meter.

  The medium pressure/low pressure parts of the WAGN GDS are those parts of the WAGN GDS operating at nominal pressures of less than 300 kPa, and include the high pressure regulators which reduce the pressure of gas below 300 kPa for subsequent flow into medium pressure/low pressure parts of the WAGN GDS.

  Other terms and conditions on which Service B2 will be provided are set out in the Template Haulage Contract.

- Service B3

  Service B3 is a pipeline service under which WAGN delivers gas to a user at a delivery point on the medium pressure/low pressure parts of the WAGN GDS using standard delivery facilities which include a standard 8 m^3/hr meter.

  The other terms and conditions on which Service B3 will be provided are set out in the Template Haulage Contract.

The five pipeline services being offered as reference services are materially the same as the reference services described in the Access Arrangement during the Second Access Arrangement Periods. WAGN has not received requests from prospective users for other pipeline services which might be sought by a significant part of the market.

WAGN previously offered five “ancillary services” in the Access Arrangement for the WAGN GDS. These five services were:

- apply meter lock service;
- remove meter lock service;
- deregistration service;
- disconnection service; and
- reconnection service.

The deregistration service was available to all users, and the disconnection and reconnection services were available only in respect of delivery points at which a users was provided with Service B2 or Service B3. The apply meter lock and remove meter lock services were only available to users provided with Service B3.

Separately identifying certain services as "ancillary services" is not consistent with the concept of "pipeline service" used in the NGL and the NGR. A pipeline service is defined as:

(a) a service provided by means of a pipeline, including –

(i) a haulage service (such as firm haulage, interruptible haulage, spot haulage and backhaul); and

(ii) a service providing for, or facilitating, the interconnection of pipelines; and

(b) a service ancillary to the provision of a service referred to in paragraph (a).

WAGN has therefore incorporated each of the five services previously designated an ancillary service into the scheme of pipeline services to be offered as reference services. The specific terms and conditions for Service A1, Service A2, Service B1, Service B2 and Service B3, set out in Schedules 1 to 5 of the Template Haulage Contract, respectively, allow a user to request deregistration of a delivery point. The specific terms and conditions for Service B2 and Service B3, set out in Schedules 4 and 5 of the Template Haulage Contract, respectively, allow a user to request:

- application of a meter lock service to a meter at a delivery point;
- removal of a meter lock which has been applied to a meter at a delivery point;
- disconnection of a delivery point; and
- reconnection of a delivery point.

2.2 Non-reference services

WAGN is prepared to negotiate the terms and conditions, including prices, for other services – non-reference services – which might be sought by prospective users.

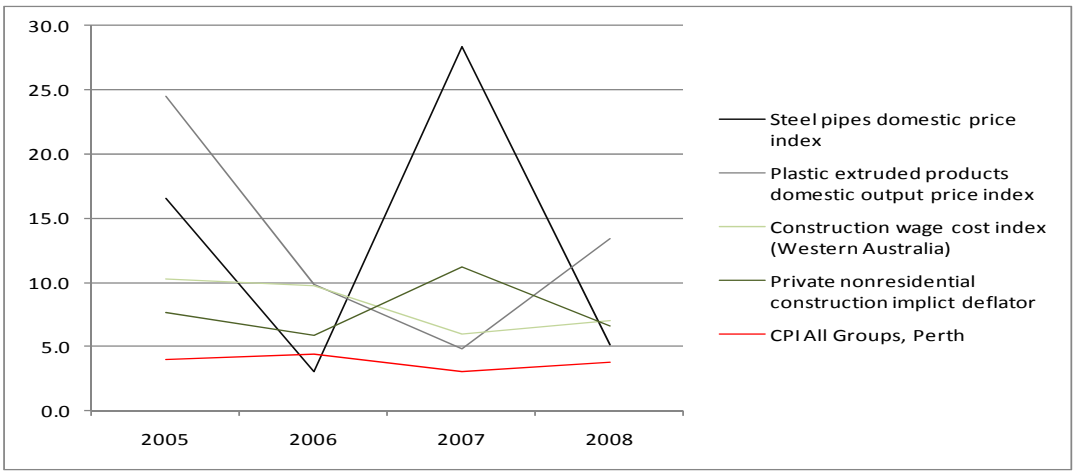
These non-reference services include services providing for, or facilitating, the interconnection of pipelines. WAGN has three contracts for interconnection services with other pipeline operators. Each of these contracts recognizes the specific technical circumstances of interconnection at a particular location. The need to recognize the specific circumstances of interconnection means that a generic interconnection contract would have little content, and that establishing a scheduled price for interconnection service is not feasible.

3 ECONOMIC OUTLOOK AND VOLUME FORECASTS

3.1 Economic activity, prices and costs

When WAGN commenced preparation of its proposed revisions to the Access Arrangement for the WAGN GDS, economic activity in Western Australia, in Australia, and in the economies of Australia's major trading partners, was at high levels. With high levels of activity internationally, the prices of the main materials used in the construction of gas distribution pipelines – steel pipe, and polyethylene pipe (manufactured from crude oil) – were increasing more rapidly than prices generally. With high levels of activity in the resources sector in Western Australia, labour costs throughout the State were also increasing at rates exceeding the general rate of price increase as measured by the Consumer Price Index (CPI). These trends in prices and costs are shown in Figure 1.

Figure 1 Prices and costs: year on year percentage changes 2005-2008



Although the global economy was "booming", signs of stress were emerging with precipitation of the subprime financial crisis the United States in 2007, and its flow on effects into financial markets internationally. By December 2008, the global economy was in a state of severe contraction, and governments in Australia and elsewhere were relaxing monetary policy and initiating very substantial economic stimulus packages. These policy initiatives appear to have arrested the decline in activity, and there are now indications that the global economy is stabilising and showing signs of recovery.

The Reserve Bank of Australia's August 2009 Statement on Monetary Policy summarises the recent Australian experience:

- December 2008 and March quarter 2009 Gross Domestic Product (GDP) data indicate a modest contraction in output, as compared with the contractions in most other countries;
- with recovery in the Chinese economy, demand for Australian exports has increased, and commodity prices have risen;
- the ASX 200 index has increased by approximately 35 per cent from its low point in early March 2009 (although it remains about 35 per cent below its peak in November 2007);
- lending approvals point to strong demand from first home buyers since the start of 2009, and house prices in a range of market sectors have begun to rise;
- business investment has remained weak, but there are some signs that confidence is returning;
- unemployment has risen from around 4 per cent in 2008 to 5.75 per cent; and
- over the year to June 2009, the CPI increased by only 1.5 per cent: price pressures in the economy are abating, and there are indications that, nationally, wage growth is slowing in an environment of weaker demand for labour.

International evidence indicates the possible duration of recovery from severe economic contraction induced by financial crisis:

- output declines last around two years on average;
- equity prices recover over a period of around 3.5 years;
- the rise in unemployment extends out over a period of around 5 years (but this period may be less in countries like Australia which have relatively flexible labour markets); and
- the recovery in house prices takes around 6 years.[2]

These circumstances make the forecasting of the demand for gas haulage services, and of costs, particularly difficult.

3.2 Forecasts of connections and gas demand

WAGN's forecast new capital expenditure for the third access arrangement period is, in part, a response to forecast demand for new connections to the WAGN GDS. A forecast

[2] Carmen M Reinhart and Kenneth S Rogoff (2009), "The Aftermath of Financial Crises", American Economic Review Papers and Proceedings, 99(2): 466-472.

increase in the number of connections is, in turn, an important factor contributing to forecast increases in gas demand, and to forecast increases in demand for haulage services provided using the WAGN GDS.

Economic Consulting Services has prepared the new connections forecast which WAGN has used to forecast expenditure on new connections. This new connections forecast has been taken into account by economic forecasters NIEIR in the preparation of a forecast of demand for haulage services.

[Deleted –Confidential]

The forecast number of delivery points for each tariff class (including those delivery points receiving prudent discounts) during the third access arrangement period is shown in Table 1 below.

Table 1 Forecast delivery points 2010(1)-2013/14

	2010(1)	2010/11	2011/12	2012/13	2013/14
Tariff class A1	76	75	74	73	73
Tariff class A2	99	102	105	108	111
Tariff class B1	1,224	1,235	1,238	1,255	1,282
Tariff class B2	7,593	7,631	7,619	7,768	8,024
Tariff class B3	600,309	610,612	625,299	641,669	659,772
Total	**609,301**	**619,655**	**634,335**	**650,873**	**669,262**

Gas demand during the second access arrangement period (Table 2) demonstrated a significant decline in tariff class A1 which was largely attributable to reduction in consumption. **[Deleted Confidential]** In addition, there was a negative impact on gas demand in tariff classes A1 and A2 as a result of the Varanus Island incident. The incident resulted in reduced commercial and industrial use during 2008. The effects of this event have been eliminated by NIEIR for the purpose of determining forecasts for the third access arrangement period.

Table 2 Gas haulage demand 2005-2009 (TJ)

	2005	2006	2007	2008	2009*
Tariff class A1	16,192	15,869	15,602	12,400	12,209
Tariff class A2	2,239	2,068	2,112	1,945	1,957
Tariff class B1	1,891	1,703	1,718	1,649	1,636
Tariff class B2	1,069	1,109	1,135	1,197	1,159

Tariff class B3	10,303	9,975	10,147	10,603	10,434
Total	**31,694**	**30,724**	**30,714**	**27,794**	**27,395**

* Estimate

Gas demand in respect of the A1and A2 tariff classes is driven by economic activity, and has been based on the NIEIR forecasts.

Forecast gas demand in the B1and B2 tariff classes has been based on NIEIR forecasts of usage rates (GJ per customer per annum), multiplied by the forecast numbers of delivery points (from Economic Consulting Services).

A usage rate of 17.74 GJ was forecast by NIEIR for financial year 2009/10 for tariff class B3. This has been adjusted to 17.84 GJ to reflect the most recent actual data obtained since the forecasts were prepared.

Based on the above assumptions, the forecast gas demand for each tariff class (including those delivery points receiving prudent discounts) during the third access arrangement period is shown in Table 3 below.

Table 3 Forecast gas haulage demand 2010(1)-2013/14 (TJ)

	2010(1)	2010/11	2011/12	2012/13	2013/14
Tariff class A1	6,163	11,947	12,165	12,680	12,899
Tariff class A2	995	2,046	2,058	2,103	2,147
Tariff class B1	762	1,688	1,710	1,793	1,873
Tariff class B2	552	1,180	1,182	1,228	1,278
Tariff class B3	4,603	10,662	10,732	11,013	11,323
Total	**13,075**	**27,523**	**27,847**	**28,817**	**29,520**

4 ACTUAL AND FORECAST CAPITAL EXPENDITURES

Revised reference tariffs for the WAGN GDS should allow WAGN to recover its total revenue over the third access arrangement period. In accordance with Rule 76, the total revenue of the WAGN GDS has been determined using the building block approach in which the building blocks are:

- a return on the projected capital base;
- depreciation on the projected capital base;
- increments resulting from the operation of an incentive mechanism; and
- a forecast of operating expenditure.

The way in which WAGN has determined each of the building blocks of total revenue is discussed in subsequent sections of this submission.

The projected capital base, on which a return is allowed, is to be determined in accordance with Rule 78. Rule 78 requires that the projected capital base for a particular access arrangement period be:

- the opening capital base; plus
- forecast conforming capital expenditure during the period; less
- forecast depreciation for the period; less
- the forecast value of asset disposals.

The opening capital base is, in turn, to be determined in accordance with Rule 77(2). The opening capital base for a later access arrangement period is to be:

- the opening capital base at the commencement of the earlier access arrangement period; plus
- conforming capital expenditure made during the earlier access arrangement period; plus
- amounts associated with capital contributions, prior speculative capital expenditures and the re-use of redundant assets; less
- depreciation during the earlier access arrangement period; less
- redundant assets identified during the earlier access arrangement period; less

- the value of pipeline asset disposals.

In this section of this submission, WAGN sets out the capital expenditures it has made during the period 2005 to 2009 (the earlier access arrangement period of Rule 77(2)), and shows that they are conforming capital expenditures. They can, therefore, be added to the opening capital base for the second access arrangement period for the purpose of deriving the capital base from which the total revenue and revised reference tariffs are determined for the third access arrangement period.

WAGN also sets out its projected capital expenditures for the third access arrangement period, and shows that these are conforming for the purpose of Rule 78. That is, they can be taken into account in determining the total revenue and revised reference tariffs for the third access arrangement period.

Conforming capital expenditures (actual and projected) are expenditures which conform with the criteria of Rule 79. The first subsection of this section – section 4.1 – summarises the requirements of that Rule.

Section 4.2 then provides a broad overview of the way in which WAGN develops the GDS. This broad overview "sets the scene" for section 4.3, *Capital expenditure 2005-2009*, and for section 4.4, *Capital expenditure 2010(I)-2013/14*. WAGN's demonstrations that its capital expenditures made during the period 2005-2009, and its forecast capital expenditures for 2010(I)-2013/14, are conforming, are set out in section 4.5. Section 4.6 sets out WAGN's approach to The Vines network, which has been absorbed into the WAGN GDS, and section 4.7 **Deleted - Confidential**. WAGN's demonstration that its actual and projected capital expenditures are conforming is summarised in section 4.8, and section 4.9 notes the treatment of asset disposals during the second access arrangement period.

4.1 The new capital expenditure criteria

New capital expenditure can be taken into account in determining the opening capital base for an earlier access arrangement period, or in determining the projected capital base of a later access arrangement period, only if it is conforming.

Rule 79(1) defines conforming capital expenditure. Conforming capital expenditure is capital expenditure which conforms with the following criteria:

- the expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services; and
- the capital expenditure is justifiable on a ground stated in Rule 79(2).

The grounds stated in Rule 79(2) are:

(a) the overall economic value of the expenditure is positive; or

(b) the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure; or

(c) the capital expenditure is necessary:

(i) to maintain and improve the safety of services; or

(ii) to maintain the integrity of services; or

(iii) to comply with a regulatory obligation or requirement; or

(iv) to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or

(d) the capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

In accordance with Rule 79(2)(a), prudently incurred and efficient capital expenditure can be added to the capital base of the WAGN GDS if the overall economic value of the expenditure is positive (economic value test).

The criterion in Rule 79(2)(b) is more explicit: prudently incurred and efficient capital expenditure can be added to the capital base of the WAGN GDS if the present value of the incremental revenue expected to be generated as a result of the expenditure exceeds the present value of the capital expenditure (incremental revenue test).

Rule 79(4) provides guidance on the way in which the present value of incremental revenue is to be determined:

- the expected incremental revenue is determined by subtracting the incremental operating expenditure from the gross revenue to be derived from the incremental services;
- the gross revenue to be derived from incremental services is to be determined from prevailing reference tariffs (or from an extrapolation of those tariffs); and

- for all present value calculations, the discount rate is equal to the rate of return implicit in the reference tariff.

WAGN has developed a cash flow model for the purpose of assessing whether capital expenditure satisfies the incremental revenue test, and has used this model in showing that its actual capital expenditures for 2005-2009, and its projected expenditures for 2010(1)-2013/14, are conforming.

WAGN has divided both its actual and projected capital expenditures into:

- expenditures which satisfy the criteria of Rule 79(2)(c); and
- expenditures which are demand or customer initiated and which are justifiable in terms of the incremental net revenue which they are expected to generate.

WAGN regards the WAGN GDS as an integrated system, and has assessed its total demand and user initiated capital expenditures against gross incremental revenue which they generate. Total demand and user initiated capital expenditure for 2005-2009 has been assessed against the incremental net revenue expected to be generated from the additional connections added to the WAGN GDS during the period 2005-2009. Similarly, total demand and user initiated capital expenditure forecast for 2010(1)-2013/14 has been assessed against the incremental revenue expected to be generated from the additional connections forecast for that period.

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WAGN's cash flow model forecasts incremental net revenue over a period of 50 years. The model assumes no new demand or user initiated capital expenditures during this period, but provides for the replacement of meters and service pipes which have an estimated economic life of 25 years.

The discounting of cash flows within the model is at 6.78% (real). This was the rate of return implicit in the calculation of the prevailing reference tariffs.

The results from WAGN's incremental revenue test modelling are reported in subsequent sub-sections of this section of this submission. Actual capital expenditures for 2005-2009, and projected capital expenditures for 2010(1)-2013/14 are shown to pass the incremental revenue test.

In consequence WAGN has not sought to apply the economic value test in showing that its actual and projected capital expenditures are conforming.

4.2 Development of the WAGN GDS

The WAGN GDS is a system of non-contiguous gas distribution pipelines and associated facilities located in the Perth metropolitan area (including Ellenbrook, Rockingham and Mandurah), and in a number of regional centres in the south west of Western Australia.

The regional centres in which the WAGN GDS is located are:

- Geraldton;
- Eneabba;
- Pinjarra;
- Harvey;
- Kemerton;
- Bunbury;
- Capel; and
- Busselton.

Discrete pipeline segments, or subnetworks, make up the WAGN GDS. At the date of this submission, these comprised approximately 12,500 kilometres of high pressure, medium pressure, medium/low pressure, and low pressure gas pipelines. Gas is delivered into each of these subnetworks from 16 receipt points immediately downstream of meter stations on the Dampier to Bunbury Natural Gas Pipeline, and from one receipt point on the Parmelia Pipeline. The WAGN GDS delivers gas to some 608,000 delivery points.

The assets which comprise the WAGN GDS are designed, constructed, operated and maintained to meet the expectations of network users and other stakeholders. The key processes involved are:

- network development;
- design and construction; and
- operation and maintenance.

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4.2.1 Network development

WAGN invests in the WAGN GDS for three main reasons:

- to provide the facilities required to meet user demand for haulage service;
- to ensure safety and system integrity; and
- to comply with relevant legislation.

The investments made to meet user demand for haulage service are the outcomes of a rigorous network planning process. Network planning is carried out to determine an efficient expansion path along which the WAGN GDS has sufficient capacity to meet user demand, given expectations of end-user growth in demand for natural gas. In its planning, WAGN uses an industry standard software package called "SynerGee" for network modelling and simulation. Network planning for future growth is often challenging because the sub-networks which comprise the WAGN GDS are not fully interconnected.

During the third access arrangement period, residential development in the Perth metropolitan area is expected to continue after reduced activity during 2009. This development will generally be in new subdivisions which abut the WAGN GDS. If WAGN is to provide haulage service to delivery points in these new subdivision, its network must be extended geographically. Geographic extension of a network comprising a number of sub-networks which are only partially interconnected, leads to pressure reductions in multiple parts of those sub-networks. Network extension requires, in these circumstances, significant augmentation of existing facilities within the sub-networks to maintain the pressures required for gas delivery to both existing and new delivery points.

Capital investment is also required to ensure the safety and integrity of the network, and to comply with the regulatory obligations. WAGN is undertaking a mains replacement program for the maintenance of system integrity, and will undertake a major program of meter changes during the third access arrangement period to meet its regulatory obligations.

Gas has been supplied to end-users in Fremantle and surrounding suburbs through cast iron pipes which were installed over 50 years ago. These cast iron pipes must be operated at low pressures, and therefore have limited capacity to supply gas into modern appliances. Modern gas appliances (in particular, instantaneous water heaters) achieve higher levels of energy efficiency through short, but intense, gas burns which require pressures in the extremities of the distribution sub-networks which are higher than were required in the past. In addition, cast iron pipes are costly to maintain, and have a propensity to develop leaks which are costly to repair. WAGN has a program for the systematic replacement of all of its old low pressure mains over a period of some 15 years. Other gas distributors, both in Australia and overseas, have adopted similar

programs for the replacement of low pressure mains over timeframes of 10 to 25 years depending on circumstances.

Through its meter change program, WAGN will replace a large number of gas meters which have now been, or which will have been at the time of replacement, in service for a period exceeding their regulated service lives. The Gas Standards (Gas Supply and System Safety) Regulations 2000 (GSSR) require that meters installed to measure domestic gas supplies be replaced after 18 years in service.

WAGN has regularly sampled its domestic meter population and tested the meters which have been in service for 18 years or more. This sampling and testing showed that M6EW domestic meters could meet the performance criteria set out in the GSSR for periods exceeding the regulated service life of 18 years. The technical and safety regulator, the Energy Safety division within the Department of Commerce, therefore approved WAGN's keeping these meters in service for a period of 25 years, after which they are to be replaced.

The long term accuracy of another type of domestic meter, type ME602, which has been used since the 1970s, is in doubt. Over time, these meters have been removed from service, repaired and returned to service. Sampling and testing of the ME602 meter population has shown that after 18 years in service, their accuracy performance whilst meeting the legislative requirements does not justify refurbishment and reuse. WAGN is therefore proposing to replace these meters with new meters.

4.2.2 Design and construction

As a prudent service provider, WAGN carries out all its design and construction work in accordance with the relevant codes and standards. The key standards include:

- AS 2885 Pipeline – Gas and Liquid Petroleum (for the design and construction of high pressure pipelines above 1,050kpa);
- AS 1697 Installation and maintenance of steel pipe systems for gas (for the design and construction of steel pipelines operating at less than 1,050kpa); and
- AS 3723 Installation and maintenance of plastic pipe systems for gas.

In addition, WAGN developed and implemented an Environmental Management System (EMS) which ensures that the construction of any gas infrastructure will have minimum impact on the environment. In particular, special consideration is given to minimising the impact on sensitive ecosystems, including national parks, reserves and vulnerable flora and flora, during the pipeline construction.

All major projects are subject to a tender process. The assessment criteria include the contractor's experience, ability to carry out the project and the contractor's quality management system. During construction projects, regular audits and inspections of contractor activities are carried out to ensure that the work is carried out in accordance with the design plans.

The location and other operational data are recorded in WAGN's Gas Network Information System (GNIS).

4.2.3 Operation and maintenance

Maintenance of the WAGN GDS is carried out to ensure that the network is operating safely and reliably in compliance with the requirements of legislation and appropriate standards (including AS 4645, Gas Distribution Network Management). Maintenance activities are carried out in accordance with reliability centred maintenance (RCM) principles. The RCM approach focuses on identifying the causes of equipment failure and the associated risks to the gas network infrastructure. A maintenance strategy for equipment has been developed in accordance with RCM principles which should ensure that the optimum frequency of work is maintained.

Steel pipelines are used in the high pressure parts of the WAGN GDS, and in parts of the medium pressure network. An important part of WAGN's maintenance activity is, then, the maintenance of facilities which protect these steel pipelines against corrosion. Corrosion protection ensures the long lives of these steel pipelines.

As a distributed network, a significant proportion of the maintenance activities are unplanned such as gas leaks caused by third party damage or age deterioration of the gas pipes.

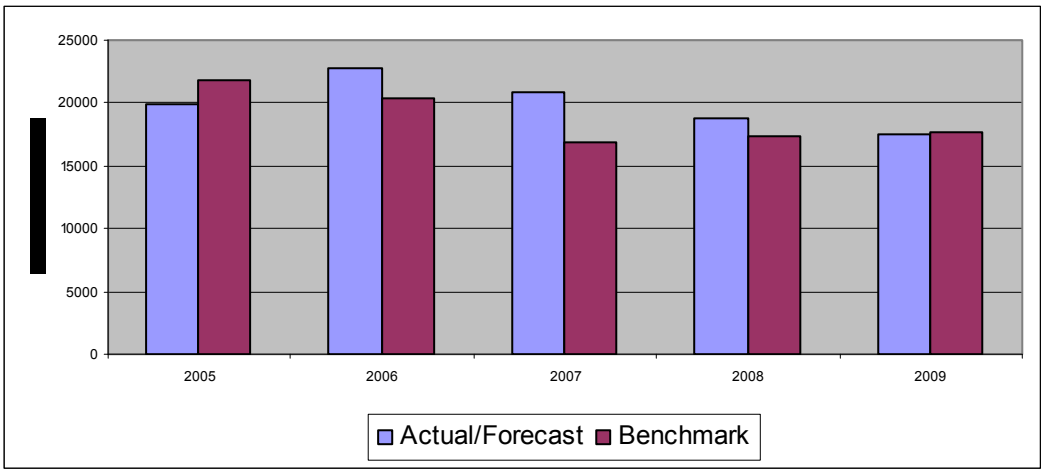
To reduce third party damage, WAGN also carries out regular patrols on the high pressure pipelines to ensure that there is no third party working within close proximity to the pipelines. Depending on the location of the pipeline, the frequency of the patrol could vary from every two days to every three months. In addition, regular leakage surveys are also carried out. These leakage surveys detect if there are any leaks in the gas distribution system. Depending on the severity of the leaks, a leak is either repaired within twenty four hours or several days.

WAGN also participates in the "Dial Before You Dig" system. This is a free referral service for contractors and utilities to call for information on underground services such as gas pipes and cables. WAGN provides information on the location of gas assets to contractors to reduce the likelihood of contractor's damaging the gas infrastructure.

4.3 Capital expenditure 2005-2009

In the last decade, WA has experienced an economic boom which resulted in unprecedented growth in the residential market. The growth in the residential market meant that WAGN also experienced significantly higher connection numbers than the benchmark numbers approved in the 2005 Access Arrangement. The figure below shows the number the actual/forecast connections versus the benchmark connection numbers.

Figure 2 New Connections 2005–2009



The high connection numbers meant that WAGN had incurred significantly higher growth capital expenditure than the benchmark costs approved in the 2005 Access Arrangement. In consequence, WAGN had to revise its other proposed capital expenditure programs such as mains replacement to ensure that the total actual capital expenditure was within the constraints of the benchmark expenditure.

Other significant factors that also contributed to the other capital expenditure not aligning with the benchmark expenditure include:

- late approval of the Access Arrangement; and
- outsourcing of all information technology services.

Details of the actual capital expenditure versus the benchmark capital expenditure are shown in Table 4.

Table 4 Actual and benchmark capital expenditure 2005-2009 ($ million, December 2009)

	2005	2006	2007	2008	2009	Total
Actual						
User Initiated	27.136	31.833	28.664	23.131	22.740	133.504
Renewals (Replacement)	0.009	0.508	0.023	5.979	5.908	12.427
Demand	0.693	0.873	6.423	3.919	12.155	24.063
Other (Performance, IT)	0.481	0.432	0.192	2.655	3.374	7.134
Total	**28.319**	**33.646**	**35.302**	**35.684**	**44.177**	**177.128**
Benchmark						
User Initiated	28.243	25.463	20.898	21.572	21.608	117.784
Renewals (Replacement)	3.56	4.293	3.927	5.523	4.175	21.478
Demand	1.467	2.578	1.597	3.43	7.108	16.180
Other (Performance, IT)	4.021	3.43	2.59	4.045	2.578	16.664
Total	**37.291**	**35.764**	**29.012**	**34.570**	**35.469**	**172.106**

4.3.1 User Initiated Capital Expenditure

The user initiated capital expenditure includes the cost of connecting new customers and the cost of miscellaneous projects (net of user contribution). The costs of new connections are for installing gas mains and services. The cost of installing gas meters is included in the cost of providing the B2 and B3 reference services. The sizes of gas mains used for extending the existing network to the locations of the new customers vary in size from 40mm to 160mm. WAGN uses contractors to install all mains and services (includes the installation of meters). The costs of miscellaneous projects include the costs of installation of new mains and of relocation of assets carried out for third parties.

[Deleted – Confidential]

In the five year period, WAGN connected 99,866 customers as compared to the 2005 forecast of 94,075 customers. The significant increase in the number of connections occurred in the years 2006, 2007 and 2008. This unprecedented increase resulted in WAGN having to revise its capital expenditure for the other activities such as replacement of old mains.

[Deleted – Confidential]

Table 5 [Deleted – Confidential]

[Deleted – Confidential]

Table 6 [Deleted – Confidential]

WAGN considers that the user initiated expenditure for the period 2005 to 2009 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the customer initiated capital expenditure was required to connect new customers to the network so that WAGN can provide its services to the customers;

Efficient – the costs incurred were from actual contractors' costs, material costs, labour charges and overheads. **Deleted - Confidential**. The majority of the costs of the projects were therefore based on market rates;

Consistent with good industry practice – WAGN's construction of mains, services and meters are in accordance with the requirements of the appropriate Australian standards. The materials used also comply with the Australian standards;

To achieve the lowest sustainable cost of providing the services – the mains, services and meters that are used to connect domestic, commercial and industrial customers have been appropriately sized so they are adequate to supply the customer demand. This enables WAGN to achieve the lowest sustainable cost of providing the services.

4.3.2 Replacement

The renewal expenditure is essentially for the replacement of the cast iron and unprotected steel mains in the low pressure and medium low pressure system. In the 2004 Asset Management Plan, WAGN had proposed to relay 30km of cast iron and unprotected steel mains per annum. The program was not commenced in 2005 due to the delay in revisions to the Access Arrangement being approved. In addition, the unprecedented growth in 2006 to 2008 meant that capital funds had to be channelled to customer connection and reinforcement projects and not to mains replacement. In 2008, the rate of customer connection decreased, allowing funds to be channelled to other projects. As such, the mains replacement program did not commence in earnest until 2008 when $5.5m was spent on replacing a proportion of cast iron mains in Fremantle and $0.3m on ad hoc mains replacement.

[Deleted – Confidential]

WAGN considers that the renewal capital expenditure for the period 2005 to 2009 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the renewal capital expenditure was required to ensure that the ageing assets were replaced in a timely manner to ensure the integrity of the network. The projects were selected on the basis that they provided the most effective solutions to the replacement of the ageing assets. In addition gas meters had been replaced to ensure that they comply with the appropriate legislation;

Efficient – the costs incurred were from actual contractors' costs, material costs, labour charges and overheads. **Deleted - Confidential**;

Consistent with good industry practice – the practice of progressively replacing ageing assets such as cast iron and unprotected steel ensures that integrity and safety of the network and is also a practice that is carried out by distributors in Australia and overseas;

To achieve the lowest sustainable cost of providing the services – with ageing assets such as cast iron mains and unprotected steel mains, WAGN considers that it is necessary to progressively replace these assets to mitigate risks as a result of catastrophic failure. In addition, safety risk associated with failure of these mains will result in substantial costs.

Details of the renewal capital expenditure are shown in the table below.

Table 7 Replacement capital expenditure 2005–2009 ($ million, December 2009)

	2005	2006	2007	2008	2009	Total
Benchmark	3.560	4.293	3.927	5.523	4.175	21.478
[Deleted – Confidential]						
Total	0.009	0.508	0.023	5.980	5.908	12.428

4.3.2.1 Fremantle mains replacement

The 2006 capital expenditure for the Fremantle mains replacement was $0.508 million. The project is related to replacing the cast iron mains in 9 areas around Fremantle.

[Deleted – Confidential]

However, due to resource constraints, the work was reduced to replacing only the mains in the worst condition consisting of 401m of 63mm diameter PE and 391m of 110mm diameter PE. 137 customers were transferred to the new gas mains.

[Deleted – Confidential]

In 2008, WAGN recommenced its replacement program. The proposal at that time was to replace the cast iron mains in Fremantle and continue to operate the areas where the mains had been replaced at low pressure. As such, 24.5kms were installed to replace the cast iron mains in 2008. The old cast iron mains were decommissioned at the same time.

The 2009 costs consist of two components, upgrading of the network with the new mains to medium pressure and a continuation of replacing the cast iron in Fremantle. In 2009, following a review of its replacement strategy, WAGN decided to adopt the policy of upgrading the pressure in the networks which have had their mains replaced from LP to HP. This will have the incidental benefit of increasing the capacity of the network to meet the organic growth in gas demand especially from high energy efficiency appliances.

The number of customers that were upgraded as part of the 2008 mains replacement program was 808 customers. The new project in the suburb of Spearwood and Hamilton Hill spans the financial year 2009/10 and consists of replacing approximately 5kms of cast iron mains and upgrading the pressure for 1,777 delivery points.

[Deleted – Confidential]

4.3.2.2 MP mains replacement

One of the material projects included in this category is the Maylands pipeline replacement.

[Deleted – Confidential]

This pipeline is a section of Pipeline 5 from East Perth to Bayswater. Pipeline 5 is one of the six pipelines which were downgraded the 1980s from HP to MP and had their corrosion protection equipment removed. In 1990, four of the six pipelines had their corrosion protection equipment reinstated. However Pipeline 5 is one of the two pipelines without corrosion protection. Following a condition assessment in 2006/07, it was decided that a section of Pipeline 5 had to be replaced. The work consists of an alternative supply of 205m of 110PE and installing 205m of 225mm PE to replace the old pipe.

Another major project in this category is the odd size mains replacement project in South Perth and Victoria Park. This project is to replace 3.81km of 380mm diameter pipe in Victoria Park and 850m of 380mm diameter pipe in South Perth.

[Deleted – Confidential]

The two sections of pipes are part of the trunk main in their respective areas. They are unable to be fitted with corrosion protection equipment and are therefore subject to corrosion. These pipelines were installed approximately 30 or 40 years ago and are of a non standard diameter. An assessment of pipe options considered that the most economical option was to replace the pipes with 160 mm diameter PE.

4.3.2.3 Other Replacement

In 2009, WAGN recommenced replacing the meters in the field that no longer comply with the compliance period. The total number of meters removed in 2009 was 7,815.

[Deleted – Confidential]

Most of the meters that have been removed are of the type ME602. These meters have been replaced by new meters.

[Deleted – Confidential]

Further information on the meter replacement program is provided in section 4.4.5.2.

In 2009, WAGN commenced a major replacement of its telemetry equipment. The telemetry equipment is installed in gate stations, large customer sites and fringe points in the network. The replacement program is based on telemetry equipment that is essentially over 15 years old and no longer serviced by the manufacturers.

[Deleted – Confidential]

4.3.3 Demand

The demand capital expenditure is for the reinforcement of the network to ensure that the network continues to meet the growth in new connections.

WAGN considers that the demand capital expenditure for the period 2005 to 2009 is consistent with the requirements of Rule 79(1) (a) for the following reasons:

Prudent – the demand capital expenditure was required to ensure that the network is able to meet the demand for service and to ensure that the integrity of the network is maintained. The projects were selected from a network planning process that had identified the areas that require further augmentation and the solutions were selected on the basis that they were the most effective solutions;

Efficient – the costs incurred were from actual contractors' costs, material costs, labour charges and overheads. **Deleted - Confidential**. The majority of the costs of the projects were therefore based on market rates;

Consistent with good industry practice – the practice of ensuring that the network is able to meet the requirements of gas demand through the network planning process is consistent with the practice carried out both in Australia and overseas. Projects were selected to meet gas demand and to ensure that there was sufficient capacity for future growth;

To achieve the lowest sustainable cost of providing the services – these augmentation projects were required to ensure that WAGN can continue to meet the required demand and to ensure that there is sufficient capacity for future growth. In the absence of such augmentation projects, WAGN could experience gas outage due to the inability of the network to meet the increased demand. The substantial cost of such outages will affect the overall viability of the network. In addition the ability of the network to meet the future demand also ensures that there is not continuous augmentation in the area as gas demand increases. These projects therefore provide the lowest sustainable costs for providing the distribution services.

Details of the demand capital expenditure are shown in the table below.

Table 8 Demand capital expenditure 2005–2009 ($ million, December 2009)

	2005	2006	2007	2008	2009	Total
Benchmark	1.467	2.578	1.597	3.430	7.108	16.180
[Deleted – Confidential]						
Total	0.693	0.873	6.423	3.919	12.155	24.063

4.3.3.1 Variable Volume Demand

The capital expenditure for the variable volume demand is associated with the upgrade of service and meters generally by the customers. Customers generally contribute to the upgrade.

4.3.3.2 Material Projects

In the period from 2005 to 2009, there were approximately 92 projects carried out. To differentiate between the major projects and the small projects, WAGN has classified any projects in excess of $0.250 million as "Material Projects" and all other projects as "Miscellaneous Projects". This section provides details of the material projects carried out in the second access arrangement period.

Baldivis HP Reinforcement

This project laid approximately 5.2km of 225diameter PEHP from Waikiki to Baldivis and installed two high pressure regulators to reinforce the medium pressure network in the Baldivis area. The project was completed between 2005 and 2007.

[Deleted – Confidential]

Joshua Brook Special Real Estate Reinforcement

This project was a third party funded project to install a HP regulator to facilitate supply to a new subdivision in Boyanup.

[Deleted – Confidential]

High Wycombe Reinforcement Project

This project was required to reinforce the medium and low pressure network. The project involves the installation of a HP regulator and a mains extension.

[Deleted – Confidential]

Southern River Project

This project involved the installation of a new HP regulator and a new mains extension of 2.5km of 160mm diameter PE. The work also involved the upgrading of approximately 500 customers from MP to PEHP supply. This project will improve the network pressures inn the Southern River MP network above the system minimum pressure.

[Deleted – Confidential]

Callista Reinforcement Project

This was a reinforcement project involving 3.2kms from Wellard Road, Kwinana Beach to the corner of Gilmore Ave and Challenger Ave, Callista. This project facilitated the HP looping in the area.

[Deleted – Confidential]

Atwell HP Reinforcement

This project was a reinforcement project to enable further expansion of the network in the southern end of Atwell and Aubin Grove. Two HP regulators were installed in 2007.

[Deleted – Confidential]

The work included relocating the gas supply from MP to PEHP.

Bunbury Cl600 Reinforcement

This project involved the installation of pressure regulating stations on pipelines 104, 47, 89 and 93 to allow the Clifton Road pipeline to operate as a Class 600 pipeline with a pressure at 3.5MPa. The reinforcement project had been identified from network planning for the Bunbury HP system which indicated pressures falling below the required minimum if no action was taken.

[Deleted – Confidential]

Rockingham to Mandurah Reinforcement

This project is required to reinforce the Rockingham HP system which currently supplies the PE high pressure and the medium pressure networks in the areas of Mandurah, Falcon and Secret Harbour. In 2007, the Department of Planning and Infrastructure had

identified significant growth in these areas through the establishment of new subdivisions. Network planning for the area had determined that there was a significant reinforcement required to ensure that the network has sufficient gas for existing customers and the increasing number of new customers. The reinforcement consists of the installation of a gate station, 16.9kms of Class 600 and Class 150 pipe and a pressure regulating station.

[Deleted – Confidential]

Table 9 [Deleted – Confidential]

[Deleted – Confidential]

The project was for the reinforcement of the North Metro sub-network **[Deleted-Confidential]**. The work included the installation of 5.8km of 200mm diameter Class 150 pipeline from the corner of Ewen St and Weaponess Road to Marmion Avenue and North Beach Road.

[Deleted – Confidential]

Hammond Park Rationalisation

This project involved the construction of 1.3km of 160mm PE pipe and the upgrading of the pressure in the southern section of the network from MP to PEHP. The area supplies gas to approximately 3,300 customers. The suburbs of Success and Hammond Park were considered to be among the fastest growing areas in the Metropolitan Development Plan. Due to the unprecedented growth in the area, WAGN constructed the additional reinforcement to upgrade the pressure from MP to PEMP. The added benefit of the project is that it provides an additional source of supply to the area thus enhancing the security of supply.

[Deleted – Confidential]

Australind Bypass Project

This project involved constructing 800m of 160mm PE pipeline across Australind Bypass and installing a Class 150HP regulator and another regulator at Millbridge Boulevarde.

[Deleted – Confidential]

4.3.3.3 Miscellaneous Projects

There approximately 74 projects that fall into this category. Most of the projects are less than $100,000. These projects were identified through the network planning process and

undertaken as required to ensure that pressures in the network did not fall below the acceptable minimum. The projects can be divided into the following activities:

- minor mains extension tie in to augment the supply in localised areas of the network;
- minor mains extension to duplicate the supply to the network;
- pressure regulating stations upgrades; and
- new pressure regulating station installation.

4.3.4 Other (Performance, IT)

The "Other' category includes IT projects and "performance" projects which are related to enhancing the functionality of network equipment (e.g. enhancing the corrosion protection equipment, assessment of the condition of pipelines, overhauling emergency equipment etc).

WAGN considers that the capital expenditure for the "Other" category for the period 2005 to 2009 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the performance capital expenditure was required to ensure that the functionality of network equipment was not compromised. These projects such as improving corrosion protection equipment were required to ensure that effectiveness of the corrosion protection equipment was maintained. Other projects such as condition assessment and overhauling the emergency equipment were required to ensure that current service levels can be maintained. In most cases, there is very little alternative to enhancing the equipment, and as such the options selected were the most effective solutions. In the case of IT, the projects were required to ensure that the network related functions can continue to operate. These functions include the ability to meet the requirements of FRC;

Efficient – the costs incurred were from actual contractors' costs, material costs, labour charges and overheads. **Deleted - Confidential**. The majority of the costs of the projects were therefore based on market rates;

Consistent with good industry practice – the practice of enhancing the network equipment to ensure their effectiveness is considered to be good industry practice and is carried out by other gas distributors. The network services that WAGN has to provide are sufficiently complex to need large IT systems. It is therefore good industry practice to ensure that the hardware and software are replaced at regular intervals to ensure there effectiveness;

To achieve the lowest sustainable cost of providing the services – these projects had been selected on the basis that there were required to maintain network services. In the absence of the projects, WAGN is placed in a situation of high risk of not been able to provide the services, and of allowing network assets to deteriorate at a higher rate (for example, because of pipeline corrosion). WAGN's inability to continue to provide the services will result in substantial costs. These projects ensure that WAGN continues to operate to achieve the lowest sustainable costs.

Details of the expenditure are shown in Table 10 below.

Table 10 Other capital expenditure 2005–2009 ($ million, December 2009)

	2005	2006	2007	2008	2009	Total
Benchmark	4.021	3.430	2.590	4.045	2.578	16.664
[Deleted – Confidential]						
Total	0.481	0.431	0.192	2.655	3.374	7.133

4.3.4.1 Performance and information technology

The projects in this category are related to improving the performance of specific equipment. Examples of the projects are upgrading of the cathodic protection systems, condition assessment of the pipelines for corrosion, replacing regulator pits to improve safety etc. There are approximately 29 projects in this category, most of which are under $100,000.

[Deleted – Confidential]

Information on the material projects are provided below.

GNIS Upgrade

The Gas Network Information System (GNIS) is used for the mapping and displaying of all the geographical locations associated with the gas distribution network. The GNIS application utilizes a number of applications which were implemented in 1998. In 2005, a review of the applications found that most of those were out of date and no longer supported by the vendor. As such there was a major upgrade of the GNIS

[Deleted – Confidential]

NMIS Upgrade

The Network Metering Information System (NMIS) is used for the metering and billing of WAGN customers. The NMIS applications used at that time was several versions behind the most supportable software. The risk of continuing to use unsupported software is the delay in rectifying any problems which would affect WAGN's ability to meet the REMCO rules.

[Deleted – Confidential]

Network Monitoring System

Currently WAGN does not have a network monitoring system for operational purposes. The current system is a very much manual approach which depends on data being collected and then collated for analysis using spreadsheets etc. It is therefore proposed to create a central repository of data which can provide data for instantaneous display of pressures in the network.

[Deleted – Confidential]

GIMS (new BMG) Upgrade

The Gas Information Management System (GIMS) converts volumetric data to units of energy. It has replaced BMG, and internally developed system which now cannot be supported. The current version of the software is several generations behind the current version and is making the GIMS substandard and not user friendly.

[Deleted – Confidential]

GDBDV/GMD Upgrade

The Gas Distribution Billing Data Verification (GDBDV) and Gas Monitoring System (GMD) is a critical subsystem within WAGN's billing system and is over 10years old. The GDBDV is used to upload, validate and transmit hourly interval meter consumption data and daily summary to the NMIS. The GMD supplies information on the gas network used for system monitoring. Given the age of the system and the difficulty in obtaining the support, WAGN proposes to replace the two systems. The objective of the project is to develop a new system which will replace the functionality of the two systems. The project will commence in 2009 and be completed by financial year 2010/11.

[Deleted – Confidential]

Project Neon

Interval meters are installed in large industrial and commercial sites. These meters are connected to the WAGN central server through remote terminal units. The data received from these sites are processed by NMIS. The objective of the project is to upgrade the Interval Metering System (IMS) and Data Processing Software to allow all the sites to communicate with the central server using General Packet Radio Service (GPRS). This will reduce the time taken to download the interval metering data. The project has been named after the new server called the Neon Server.

[Deleted – Confidential]

4.4 Capital Expenditure 2010(I) – 2013/14

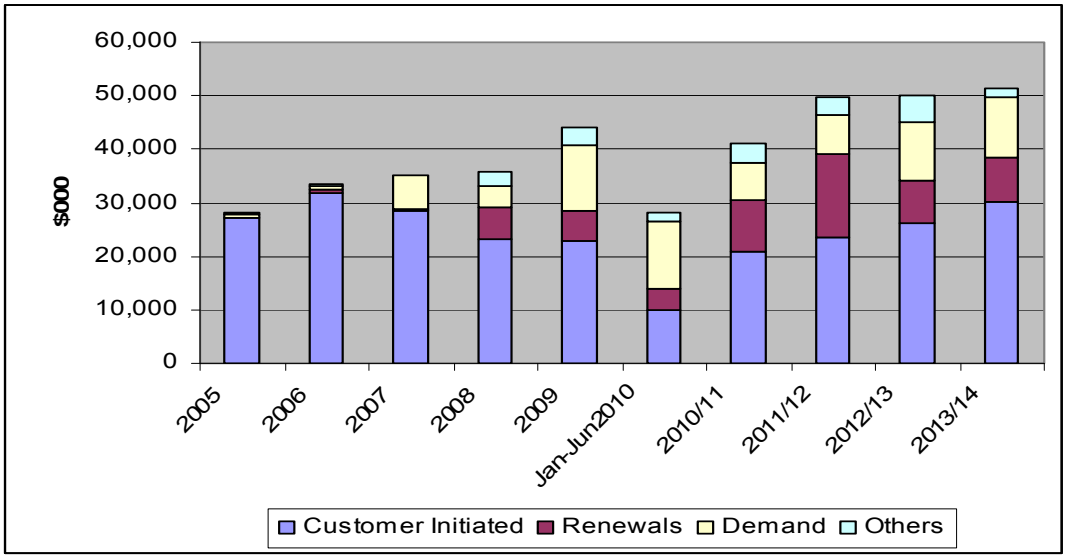
WAGN had based its forecast capital expenditure for the period 2010(I) – 2013/14 on a detailed network planning process to ensure that the network continues to perform in accordance with customer expectation, customer demand and legislative requirements. Specifically the factors that have been taken into account include:

- expansion of the network for new customer connections;
- augmentation of the network to meet growth in demand;
- replacement of ageing assets to ensure that the network meets its service requirements;
- improvement in public safety; and
- compliance to safety, environmental and technical requirements.

[Deleted – Confidential]

A comparison of the forecast expenditure to the actual expenditure is shown in Figure 3 below.

Figure 3 Actual and forecast capital expenditure 2005–2013/14 ($ million, December 2009)



Forecast capital expenditure has been calculated from the work volume multiplied by the unit costs. As mentioned above, with the exception of the customer initiated capital expenditure, the work volume of the other categories have been derived from the network planning process. The work volume for the user initiated capital has been derived from the forecast connection numbers from the Economic Consulting Services (ECS) for the residential market and National Institute of Economic and Industry Research (NIEIR) for the commercial market. These unit rates have been determined predominately from the actual unit rates incurred in this current period and derived from projects which have been carried out by third parties. Where relevant, the actual unit rates have been modified to include any new legislative or regulatory requirements. The unit rates have also been adjusted in accordance with the labour (construction and non construction) and material price escalation above inflation.

Details of the forecast capital expenditure are shown in Table 11 below.

Table 11 Forecast capital expenditure 2010(1)–2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
User Initiated	9.890	21.000	23.391	26.204	30.115	**110.600**
Renewals (Replacement)	4.058	9.459	15.749	7.839	8.274	**45.379**
Demand	1.249	5.785	7.210	6.749	10.762	**31.753**
Other (Performance, IT)	12.873	4.759	3.232	9.256	2.287	**32.407**
Total	**28.070**	**41.002**	**49.582**	**50.048**	**51.438**	**220.140**

4.4.1 Capital Overheads

The costs shown in Table 11 include an overhead component. This overhead is essentially for WAGN to scope, design and project manage each project.

[Deleted – Confidential]

Table 12 [Deleted – Confidential]

It is worth noting that the total overhead cost relating to capital works has been deducted from the operating cost required to manage the network. Any changes to the capital overhead rate will therefore change the trade off between capital and operating expenditure.

4.4.2 Labour and Material Indices

The costs shown in Table 11 have been adjusted for the labour and materials indices above CPI. These indices have been provided by the independent consultant, NIEIR.

[Deleted – Confidential]

Table 13 [Deleted – Confidential]

The cost has then been adjusted to real 2009 using a forecast CPI of 2.5%.

4.4.3 Forecast Labour and Material Costs

WAGN has outsourced the majority of its capital works program. The customer initiated capital works are carried out by contractors which are listed on a contractor's panel. At regular intervals, WAGN has tested the market to ensure that the contractors on the panel have rates which are consistent with the lowest sustainable costs.

A similar process is carried out for the procurement of materials. A public tender process is conducted to ensure that the material prices are at current market rates.

WAGN seeks competitive tenders for major projects including mains laying for augmentation and mains replacement projects.

The direct cost estimates for both labour and material for the forecast work program (discussed below) are derived from the actual market rates from existing projects. Any specialist works such as leakage survey and pressure control are carried out by WAGN resources. The estimates for labour costs are from current projects.

4.4.4 User Initiated Capital Expenditure

User initiated capital expenditure is the investment made in extending gas mains to pass the customer premises, and the construction of service pipes from the mains into those premises. In the case of Services B2 and B3, the cost also includes cost of the installation of gas meters. Details of the capital expenditure are shown in Table 14 below.

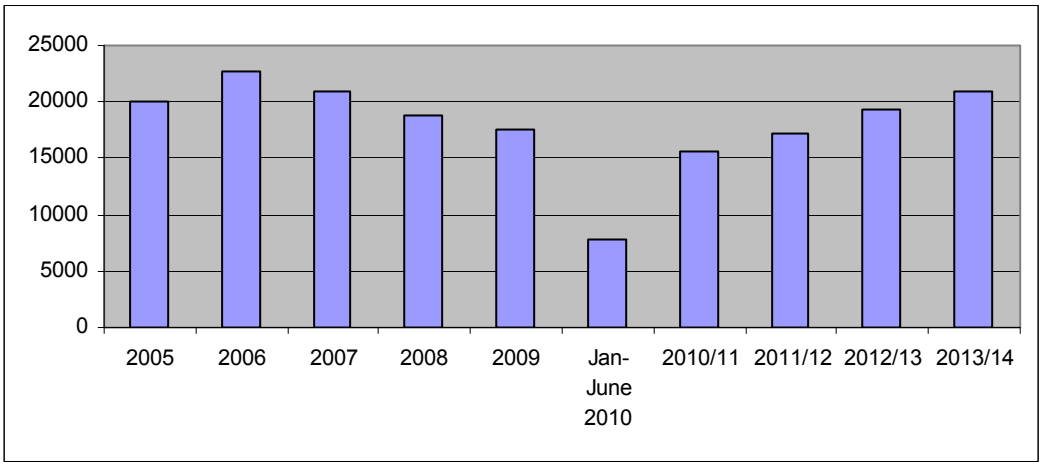
Table 14 User initiated capital expenditure ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
[Deleted – Confidential]						
Total	**9.890**	**20.999**	**23.391**	**26.203**	**30.115**	**110.598**

It should be noted that the mains cost is for installing mains with different diameters (40mm to 160mm) depending on delivery point locations. Similarly the costs reflect he different costs of connection in established and in greenfields sites.

The forecast customer connection growth for tariff class B3 for the period 2010(1)–2013/14 is based on work carried out by ECS. Gas connections peaked in 2006 and have since showed a slow decline to the current levels. ECS expects that the number of connections will stabilise in 2010 and then pick up from mid 2010 reflecting the underlying demand for dwellings. In summary, ECS has forecast 15,630 new connections in 2009/10, levelling out in 2010/11, and a gradual increase to 20,039 by 2013/14. The connection trend is illustrated in Figure 4 below.

Figure 4 New connection trend



[Deleted – Confidential]

Table 15 [Deleted – Confidential]

[Deleted – Confidential]

WAGN considers that the capital expenditure for the User Initiated category for the period 2010 to 2014 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the customer initiated capital expenditure is required to connect new customers to the network so that WAGN can provide its services to the customers;

Efficient – the forecast costs have been derived from actual contractors' costs, material costs, labour charges and overheads. The overhead has been calculated using a bottom up approach on the extent of labour required to manage the capital expenditure programme;

Consistent with good industry practice – WAGN construction of mains, services and meters are in accordance with the requirements of the appropriate Australian standards. The materials used also comply with the relevant Australian standards; and

To achieve the lowest sustainable cost of providing the services – the mains, services and meters that are used to connect domestic, commercial and industrial customers have appropriately sized so that it is adequate to supply the customer demand. This enables WAGN to achieve the lowest sustainable cost of providing the services.

4.4.5 Renewal Capital Expenditure

The renewal capital expenditure is for the replacement of ageing network assets to ensure that the network can continue to provide its services safely and reliably and WAGN is meeting its regulatory obligations. The main category that is being replaced is the cast iron pipes in Fremantle followed by meter replacement. WAGN's main operational centre is also outdated and requires a major refurbishment. Other miscellaneous assets that are been replaced include telemetry, valves, pits and corrosion protection equipment. The capital expenditure for the renewal program is shown in Table 16 below.

Table 16 Renewal (asset replacement) capital expenditure 2010(1)-2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
[Deleted – Confidential]						
Total	**4.059**	**9.461**	**15.749**	**7.840**	**8.276**	**45.385**

WAGN considers that the renewal capital expenditure for the period 2010 to 2014 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the renewal capital expenditure is required to ensure that the ageing assets are replaced in a timely manner to ensure the integrity of the network. The projects were selected on the basis that they provided the most effective solutions to the replacement of the ageing assets. In addition gas meters are being replaced to ensure that they comply with the appropriate legislation. **[Deleted – Confidential];**

Efficient – the forecast costs have been derived from actual contractors' costs, material costs, labour charges and overheads. The overhead has been calculated using a bottom up approach on the extent of labour required to manage the capital expenditure programme;

Consistent with good industry practice – the practice of progressively replacing ageing assets such as cast iron and unprotected steel ensures that integrity and safety of the network and is also a practice that is carried out by distributors in Australia and overseas. **[Deleted – Confidential]**; and

To achieve the lowest sustainable cost of providing the services – with ageing assets such as cast iron mains and unprotected steel mains, WAGN considers that it is necessary to progressively replace these assets to mitigate risks as a result of catastrophic failure. In addition, safety risk associated with failure of these mains will

result in substantial costs. A similar situation arises from the replacement of other assets including meters which have exceeded their statutory time limit in the field. **[Deleted – Confidential].** All these initiatives ensure that WAGN continue to maintain the lowest sustainable costs of providing the services.

4.4.5.1 Cast iron replacement and non-standard mains program

In 2009, WAGN reviewed its strategy for the cast iron and unprotected steel mains. WAGN decided that it has insufficient information to support the strategy of replacing the old gas mains at 30kms per year (which was not achieved in the current AA period as discussed in section 4.3.2.1 due to capital constraints). In addition, the strategy of replacing the old mains and continuing to operate the network in low pressure was no longer appropriate given the increasing use of more efficient appliances which has resulted in increasing the peak hourly gas demand. The strategy was revised to replace the old gas mains and increase the pressure to MP in the renewed network. This would ensure the ongoing integrity of the network, and cater for the use of the high efficiency appliances. However, the increased cost of the revised strategy and meant that WAGN had to revise its replacement rate. WAGN decided that as some of the cast iron mains are over 100years old, priority should be given to replacing these mains before embarking on a program of replacing the unprotected steel mains. It is therefore proposed that the replacement of the cast iron (mainly in Fremantle) be carried out at a rate of 6kms per years which makes it commensurate with the original proposal of completion between 10 to 15 years. This would mean that the work would be completed between 2020 and 2025. Further investigation can be carried out in the next Access Arrangement period to determine the completion time for the unprotected steel mains.

The strategy review also highlighted the need to replace 20kms of unprotected steel mains which have non standard diameters. These mains form part of the backbone of the distribution network but due to their age are starting to corrode. In addition their non standard sizes also means that there ise no emergency equipment to stop gas escapes. For safety reasons, WAGN proposes to replace these pipes over the next access arrangement period.

In addition, WAGN had set aside a provision to replace sections of a number of MP steel pipelines which form part of the backbone of the MP networks. These pipelines are in Shenton Park, Floreat, Wembley and Osborne Park. The pipelines are only protected from corrosion by their protective coating which over time has deteriorated. However, before replacing the pipelines, WAGN will be carrying out condition assessments on the pipelines to determine the necessity of this replacement.

Details of the cast iron mains, non standard size and ageing pipeline replacement costs are shown in the Tables 17, 18 and 19 below.

Table 17 [Deleted – Confidential]

[Deleted – Confidential]

Table 18 [Deleted – Confidential]

[Deleted – Confidential]

Table 19 [Deleted – Confidential]

[Deleted – Confidential]

4.4.5.2 Meter Replacement

The meter replacement program consists of replacing meters used for residential and small commercial/industrial customers. These meters usually referred to as domestic meters have a capacity of 6m^3/hr and consist of mainly two types; ME602 and M6EW. The ME602 was introduced in the 1970s and the M6EW in the 1980s.

The period when a meter can be retained in the field is called the in service life and is regulated by the Gas Standards (Gas Supply and System Safety) Regulations 2000 (GSSR). Under the GSSR, a domestic meter has in service life of 18 years. After 18 years, a meter has to be replaced by a new or repaired meter. Based on the WAGN's sampling programs carried out since 2005, Energy Safety Division (ESD) has approved the extension of the meter family life for M6EW to 25 years. As such, WAGN proposes to remove ME602 after 18 years in service life and M6EW after 25 years in service life.

The ME602 family that was introduced in the 1970s have been used in the field and removed after the expiry of their in service life and repaired and reused. This means that some of these meters could have had two or three refurbishments. As such, in the next access arrangement period, WAGN proposes to remove ME602 meters which have reached their in-service lives and replace them with new meters. Similarly, WAGN proposes to adopt the same policy for the M6EW meters.

Deleted - Confidential

Table 20 [Deleted – Confidential]

4.4.5.3 PMD Data Visualisation

Currently WAGN does not monitor the pressure on a real time basis. The current process is a manual one which involves the gathering of data from different sources and collating it for analysis using desktop type processes such as Excel.

[Deleted – Confidential]

4.4.5.4 AS 2885 Slabbing

In 2007, the latest revision of the Australian Standard AS 2885-1 was issued with a number of additions.

[Deleted – Confidential]

Table 21 [Deleted – Confidential]

4.4.5.5 [Deleted – Confidential]

4.4.5.6 Telemetry replacement

Telemetry equipment is electronic equipment used in the field for monitoring and transmitting data on gas pressure, temperatures and gas flow.

[Deleted – Confidential]

Table 22 [Deleted – confidential]

4.4.5.7 Miscellaneous replacement

The miscellaneous replacement category consists of mainly small projects for the replacement of specific equipment.

[Deleted – Confidential]

4.4.6 Demand Capital Expenditure

WAGN forecast demand capital is to ensure that there is adequate capacity to meet the new customer demands and to ensure there is loss of supply due to lack of capacity. The projects have been divided into material projects over $250,000 and miscellaneous projects less than $250,000 as shown in Table 23.

Table 23 Demand capital expenditure 2010(1)-2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
Material projects >$250k	0.817	5.115	6.721	6.153	10.303	**29.109**
Misc projects <$250k	0.432	0.670	0.489	0.596	0.458	**2.645**
Total direct cost ($m)	**1.249**	**5.785**	**7.210**	**6.749**	**10.761**	**31.754**

WAGN considers that the demand capital expenditure for the period 2010 to 2014 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the demand capital expenditure is required to ensure that the network is able to meet the demand for service and to ensure that the integrity of the network is maintained. The projects were selected from a network planning process that had identified the areas that require further augmentation and the solutions were selected on the basis that they provide the most effective solutions;

Efficient – the forecast costs have been derived from actual contractors' costs, material costs, labour charges and overheads. The overhead has been calculated using a bottom up approach on the extent of labour required to manage the capital expenditure programme;

Consistent with good industry practice – the practice of ensuring that the network is able to meet the requirements of the gas demand through the network planning process is consistent with the practice carried out both in Australia and overseas. The project has been selected to meet the requirements of the gas demand and to ensure that there is sufficient capacity for future growth;

To achieve the lowest sustainable cost of providing the services – these augmentation projects are required to ensure that WAGN can continue to meet the required gas demand and to ensure that there is sufficient capacity for future growth. In the absence of such augmentation projects, WAGN could experience gas outage due to the inability of the network to meet the increased demand. The substantial cost of such outages will affect the overall viability of the network. In addition the ability of the network to meet the future demand also ensures that there is not continuous augmentation in the area as the gas demand increases. These projects therefore provide the lowest sustainable costs for providing the distribution services.

[Deleted – Confidential]

Table 24 [Deleted – Confidential]

[Deleted – Confidential]

4.4.7 Other (Performance, IT)

As discussed in Section 4.3.4, the "Other Expenditure" category consists of IT projects and "Performance" projects. Performance projects are for enhancing the functionality of

network related equipment (e.g. corrosion protection system, condition assessment of the pipelines and overhauling emergency equipment etc).

[Deleted – Confidential]

Table 25 [Deleted – Confidential]

[Deleted – Confidential]

WAGN considers that the capital expenditure for the "Other" category for the period 2010 to 2014 is consistent with the requirements of the National Gas Rules 79(1) (a) for the following reasons:

Prudent – the performance capital expenditure is required to ensure that the functionality of the network equipment was not compromised. These projects such as improving the corrosion protection equipment were required to ensure that effectiveness of the corrosion protection equipment. Other projects such as condition assessment and overhauling the emergency equipment were required to ensure that the WAGN can continue to provide the current level of service. In most cases, there is very little alternative to enhancing the equipment, as such WAGN considers that the options selected were the most effective solutions. In the case of IT, the projects were required to ensure that the network related functions can continue to operate (to maintain the integrity of the service and to comply with regulatory obligations). These functions include the ability to meet the requirements of FRC;

Efficient – the forecast costs have been derived from actual contractors' costs, material costs, labour charges and overheads. The overhead has been calculated using a bottom up approach on the extent of labour required to manage the capital expenditure programme. The forecast costs of the IT projects have been estimated from the actual costs of similar projects;

Consistent with good industry practice – the practice of enhancing the network equipment to ensure their effectiveness is considered to be good industry practice and is carried out by other gas distributors. The network services that WAGN has to provide are sufficiently complex to need large IT systems. It is therefore good industry practice to ensure that the hardware and software are replaced at regular intervals to ensure their effectiveness;

To achieve the lowest sustainable cost of providing the services – these projects had been selected on the basis that there were required to maintain the network services. In the absence of the projects, WAGN is placed in a high risk of not being able to provide the services and the network assets will deteriorate at a higher rate e.g. corrosion in the pipeline. WAGN's inability to continue to provide the services will result in substantial

costs. These projects ensure that WAGN continues to operate to achieve the lowest sustainable costs.

There are 37 projects in the category Performance. As mentioned at the start of this section, majority of the project are between $10,000 and $90,000.

[Deleted – Confidential]

IT projects

Projected information technology capital expenditure is shown in Table 26.

Table 26 IT capital expenditure 2010(1)-2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
[Deleted – confidential]						
Total	**1.316**	**3.474**	**3.041**	**4.878**	**1.492**	**14.201**

[Deleted – Confidential]

4.5 Applying the criteria of Rules 79(2)(b) and (c)

4.5.1 Capital expenditure 2005-2009

Table 27 lists all of the major projects which WAGN expects to undertake. Table 28 summarises WAGN's variable volume capital expenditure forecast. Variable volume capital expenditure is the capital expenditure on mains extensions, feeders and service pipes required to allow WAGN to make the numbers of new customer connections forecast for the third access arrangement period. Forecast capital expenditure on information technology is summarised in Table 29.

The forecast capital expenditures in each of the tables are classified in two ways:

- by the type of expenditure recognized for asset planning and management purposes; and
- by type of expenditure for the calculation of regulatory depreciation.

The types of expenditure for asset management and planning are:

DEM	Demand expenditure: expenditure required to meet growing demand for haulage service
AR	Asset replacement: expenditure required to replace assets which have reach the ends of their useful lives
PER	Performance: expenditure on facilities and equipment required to enhance performance of the network
C	Customer initiated: expenditure which is directly attributable to the requirement to create new customer connections in the network

The types of expenditure for calculation of regulatory depreciation are:

HP	High pressure mains
MLP	Medium/low pressure mains
REG	Regulators
GS	Gate stations
MSP	Meters and service pipes
EQUIP	Equipment and vehicles
IT	Information technology
BUILD	Buildings

The final column of each of Tables 27, 28, and 29 shows the grounds on which the forecast expenditures are justified as being forecast conforming capital expenditure which can be taken into account in determining the projected capital base for the third access arrangement period.

Table 27 [Deleted – Confidential]

Table 28 [Deleted – Confidential]

Table 29 [Deleted – Confidential]

Capital expenditure by type of expenditure for asset management and planning is summarized in Table 30.

Table 30 Capital expenditure: by type: 2005–2009 ($ million, December 2009)

	2005	2006	2007	2008	2009
Demand	0.693	1.942	5.669	2.166	6.550
User initiated	27.379	33.476	30.556	24.448	22.797
Asset replacement	0.009	0.508	0.023	5.979	5.925
Performance	0.481	0.432	0.402	4.371	8.881
[Deleted – Confidential]					
Capital expenditure	**28.320**	**33.645**	**35.303**	**35.683**	**44.178**

Demand and user initiated capital expenditures shown in Table 30 are driven by increases in haulage volumes and increases customer numbers. The present value of 2005-2009 demand and user initiated capital expenditure is $151.1 million (present value at 1 January 2005). The present value of the expected incremental net revenue from the increases in haulage volumes and customer connections associated with this expenditure is $229.1 million. The present value of incremental net revenue expected to be generated as a result of the expenditure exceeds the present value of the capital expenditure. The incremental revenue test of Rule 79(2)(b) is satisfied: demand and customer initiated capital expenditure for 2005-2009 is justifiable.

Capital expenditures designated as being required for asset replacement and performance are included in the projected capital base on the grounds that they are necessary for one of the purposes of Rule 79(2)(c). Specific items of expenditure, and the specific parts of the test of Rule 79(2)(c) which they satisfy were set out in Tables 27, 28 and 29.

4.5.2 Projected capital expenditure 2010(I)-2013/14

Projected capital expenditure on the WAGN GDS during the third access arrangement period is summarised below.

Table 31 lists all of the major projects which WAGN expects to undertake. Table 32 summarises WAGN's variable volume capital expenditure forecast. Variable volume capital expenditure is the capital expenditure on mains extensions, feeders and service pipes required to allow WAGN to make the numbers of new customer connections forecast for the third access arrangement period. Forecast capital expenditure on information technology is summarised in Table 33.

The final column of each of Tables 31, 32 and 33 shows the grounds on which the forecast expenditures are justified as being forecast conforming capital expenditure which

can be taken into account in determining the projected capital base for the third access arrangement period.

Table 31 [Deleted – Confidential]

Table 32 [Deleted – Confidential]

Table 33 [Deleted – Confidential]

Table 34 Forecast capital expenditure: by type: 2010(1)–2013/2014 ($ million, December 2009)

	2010(I)	2010/11	2011/12	2012/13	2013/14
Demand	1.243	9.886	7.198	6.737	10.750
User initiated	10.098	21.417	23.849	26.708	30.661
Asset replacement	4.058	9.459	15.749	7.839	8.274
Performance	12.873	4.759	3.233	9.256	2.287
[Deleted – Confidential]					
Capital expenditure	**28.070**	**45.115**	**49.582**	**50.048**	**51.437**

The forecasts of demand and user initiated capital expenditures shown in Table 34 are driven by forecast increases in haulage volumes and forecast increases customer numbers. The present value of projected 2010(1)-2013/14 demand and user initiated capital expenditure is $84.5 million (present value at 1 January 2005). The present value of the expected incremental net revenue from the increases in haulage volumes and customer connections associated with this expenditure is $89.0 million. The present value of incremental net revenue expected to be generated as a result of the expenditure exceeds the present value of the capital expenditure. The incremental revenue test of Rule 79(2)(b) is satisfied: projected demand and customer initiated capital expenditure for 2010(1)-2013/14 is justifiable.

Forecast capital expenditures designated as being required for asset replacement and performance are included in the projected capital base on the grounds that they are necessary for one of the purposes of Rule 79(2)(c). Specific items of expenditure, and the specific parts of the test of Rule 79(2)(c) which they satisfy were set out in Tables 31, 32 and 33.

4.6 The Vines

In 1994, the State Energy Commission of Western Australia, then the owner and operator of the gas distribution systems which were subsequently identified as the WAGN began construction of gas distribution facilities to serve a new residential development at The Vines, north of Perth. These distribution facilities supplied customers with LPG. They were subsequently transferred to AlintaGas, but were not part of the AlintaGas distribution systems which were covered at the date of commencement of the Code, and listed in the Code's Schedule A. AlintaGas therefore excluded the distribution facilities serving The Vines from the assets which formed capital base of the WAGN GDS during the first access arrangement period.

During the Second Access Arrangement Period (in 2006), gas retailer AlintaGas Sales converted all end user appliances in The Vines for operation on natural gas. AlintaGas Networks connected The Vines facilities to the WAGN GDS, ceased supplying LPG, and began delivering natural gas to the end users.

WAGN has now added the capital value of The Vines facilities to the opening capital base of WAGN GDS at commencement of the Third Access Arrangement Period for subsequent recovery via reference tariffs. WAGN has, in effect, treated the value of The Vines distribution facilities as new capital expenditure incurred for the purpose of the extending the WAGN GDS, and has treated the extension as part of the covered pipeline.

The gas distribution facilities which have been installed in The Vines are typical of the facilities which WAGN provides in urban residential developments. The value of those facilities has been based on a level of capital expenditure which would have been incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.

Table 35 [Deleted – Confidential]

The capital value attributed to The Vines has been included in the demand and customer initiated capital expenditure for 2005-2009. This expenditure satisfies the incremental revenue test of Rule 79(2)(b).

4.7 [Deleted – Confidential]

Table 36 [Deleted – Confidential]

4.8 Actual and projected capital expenditure is conforming

In section 4.3 of this submission, WAGN demonstrated that its capital expenditure during the second access arrangement period - 2005-2009 - was such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services. In section 4.5.1, WAGN showed that, of $177.128 million of expenditure over the access arrangement period, some $19.578 million was for asset replacement or for the maintenance and improvement of pipeline system performance. It satisfied one or more of the criteria in Rule 79(2)(c). The remainder of the expenditure - demand and customer initiated capital expenditure - was shown to be justifiable because it satisfied the criterion of Rule 79(2)(b): the present value of the expected incremental revenue to be generated as a result of the expenditure exceeded the present value of the capital expenditure.

WAGN has therefore concluded that all of its capital expenditure during the second access arrangement period is conforming, in accordance with the requirements of Rule 79. In accordance with Rule 77(2), it can be added to the capital base of the WAGN GDS for the purpose of determining the opening capital base for the third access arrangement period.

In section 4.4 of the submission, WAGN demonstrated that its projected capital expenditure for the third access arrangement period was such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services. In section 4.5.2, WAGN showed that, of $224.252 million of expenditure planned for the third access arrangement period, some $65.983 million was for asset replacement or for the maintenance and improvement of pipeline system performance. It satisfied one or more of the criteria in Rule 79(2)(c). The remainder - projected demand and customer initiated capital expenditure - was shown to be justifiable because it satisfied the criterion of Rule 79(2)(b): the present value of the expected incremental revenue to be generated as a result of the expenditure exceeded the present value of the capital expenditure.

WAGN has therefore concluded that all of its projected capital expenditure for the third access arrangement period is conforming, in accordance with the requirements of Rule 79, and can be taken into account, in accordance with Rule 78, when determining the total revenue and revised reference tariffs for the WAGN GDS.

4.9 Asset disposals

In accordance with Rule 77(2), the opening capital base for the third access arrangement period is to be determined by adjusting the opening capital base at the commencement of the second access arrangement period for:

- conforming capital expenditure during the second access arrangement period;
- amounts associated with capital contributions, prior speculative capital expenditures and redundant assets;
- depreciation; and
- the value of asset disposals.

Previous sections of this submission have established the conforming capital expenditure during the second access arrangement period (2005-2009). Capital contributions during the period have been deducted from the conforming capital expenditure, and there were no prior speculative capital expenditures or capital redundancies to be taken into account. However, certain assets were disposed of, and have been removed from the capital base of the WAGN GDS.

The values of land and buildings shown in Table 37 were included in the capital base at the commencement of the second access arrangement period.

Table 37 Asset disposals ($ million, December 2009)

	Land ($ million)	Buildings ($ million)	Date of disposal
Ballajura	2.362	0.574	January 2004
Mt Claremont	0.753		August 2003
Bentley	0.307	0.466	January 2005
Total	**3.422**	**1.040**	

Land and buildings in Mt Claremont had been sold in August 2003, and the value of the buildings sold was removed from the capital base of the WAGN GDS at the commencement of the second access arrangement period. The value of the land was, however, inadvertently retained in the capital base.

The Ballajura depot was sold in January 2004, a short time before proposed revisions to the Access Arrangement for the WAGN GDS were to be submitted for approval, and details of the transaction were not captured in the financial data compiled for access arrangement preparation.

These issues have been addressed in establishing the opening capital base for the third access arrangement period. The value of the land in Mt Claremont, and the value of the land and buildings at Ballajura, have now been removed from the capital base.

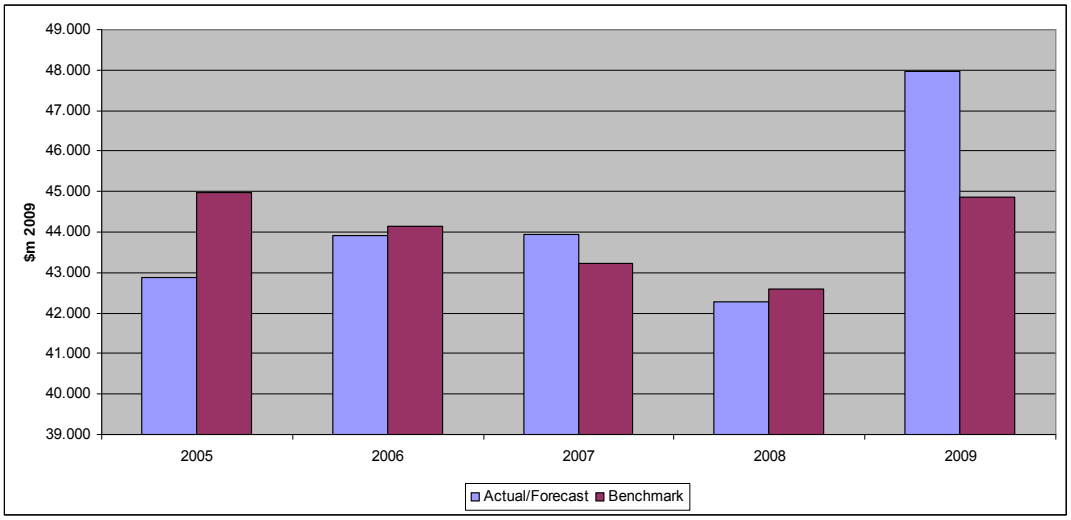
The value of land and buildings at Bentley, which were sold in January 2005, has also been deducted in establishing the opening capital base for the third access arrangement period.

5 OPERATING EXPENDITURE

5.1 Operating expenditure 2005-2009

WAGN actual operating expenditure in the current period as compared to the benchmark expenditure approved in the 2005 AA is as shown in Figure 5.

Figure 5 Operating Expenditure 2005–2009



Details of the actual expenditure are shown in Table 38.

Table 38 Actual Operating Expenditure 2005–2009 ($ million, December 2009)

	2005	2006	2007	2008	2009*
Operations	27.182	28.186	26.013	25.042	25.466
Unaccounted for gas	3.626	3.659	4.496	6.482	7.694
Regulatory	1.111	1.196	1.341	3.102	4.557
Information technology	5.029	4.97	5.335	3.109	4.458
Corporate	5.941	5.904	6.764	4.552	5.797
Total	**42.889**	**43.915**	**43.949**	**42.287**	**47.972**

* Estimate

The network operations costs show a declining trend over the five year period. This is despite work volumes remaining fairly constant (except for gas meter management and refurbishment).

Table 39 [Deleted – Confidential]

5.2 Operating Expenditure 2010(1)–2013/14

WAGN has forecast its operating expenditure using a ground up approach. In terms of the network operations expenditure, a number of workshops were conducted to critically review the manning level, material requirement and the volume of work. Information from the workshops was used to set the 2009 expenditure which became the base for the forecast period.

The 2009 expenditure was then adjusted by a number of factors to forecast the operating expenditure for the regulatory period 2010 – 2014. The factors include:

- increased volume of work due to deteriorating assets, increased customer numbers and expansion of the network;
- adjustment of forecast expenditure related to labour (construction and non construction) and material price escalation above the expected inflation;
- changes due to increased regulatory, legislative, health and safety obligations;
- expenditure that has been attributed to capital expenditure activities deducted from the operating expenditure; and
- costs associated with non regulated assets deducted from the operating costs.

The forecast expenditures for the other categories were also critically reviewed and developed in a similar manner.

[Deleted – Confidential]

Table 40 [Deleted – Confidential]

The table below shows the forecast operating expenditure.

Table 41 Forecast operating expenditure 2010(1)–2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14	Total
Operations	20.679	27.431	28.2	28.372	27.834	132.516
Marketing	0.177	2.598	1.086	1.091	1.097	6.049
Unaccounted for gas	4.874	10.259	10.379	10.741	11.003	47.256
Information technology	2.791	5.956	6.167	5.839	6.21	26.963
Corporate	3.983	7.966	7.966	7.966	7.966	35.847
Regulatory	3.914	5.411	5.403	6.172	6.617	27.517
Total	**36.418**	**59.621**	**59.201**	**60.181**	**60.727**	**276.148**

5.2.1 Operations costs

The operations costs are all costs associated with managing and maintaining the gas network. **[Deleted – Confidential]**

Table 42 [Deleted – Confidential]

5.2.1.1 Asset management

Asset management includes a number of operational activities required to design, construct and maintain the network. The activities include:

- asset services which provides the strategic planning for the expansion and maintenance of the network, design and construction of the network;
- gas inspectors responsible for the inspection of the gas installations downstream of the customer meters;
- management responsible for the supervision of staff and engagement of consultants for specific reviews;
- maintenance centres responsible for the planned and unplanned maintenance activities including providing a 24 hour emergency response capability;
- business improvement and training responsible for the development of safety related procedures etc;
- **[Deleted – Confidential]**;

- new depot costs refers to the cost of running the extra operational centres. **[Deleted – Confidential]** in response to the geographical expansion of the network; and
- accommodation cost for head office staff.

The costs for each activity are based on the forecast workload, labour, equipment and materials costs. As appropriate the costs have been adjusted in accordance with the labour or materials indices.

[Deleted – Confidential]

Table 43 [Deleted – Confidential]

As part of this process, any costs associated with capital activities have been identified and transferred to capital expenditure. **[Deleted – Confidential]**

Asset management costs show a reducing trend implying an improved efficiency in the period 2010 to 2014. This is partially due to the same labour force transferring more costs to capital as a result of higher capital workload in this period.

5.2.1.2 Direct Maintenance

Direct maintenance activities include variable volume maintenance and ancillary maintenance projects which are not chargeable to a third party (e.g. painting of meter sets, Dial before you Dig (DBYD) charges, relocation of major mains etc.). **[Deleted – Confidential]**

Table 44 [Deleted – Confidential]

5.2.1.3 Variable volume maintenance

Variable volume maintenance refers to the planned and unplanned or reactive activities associated with the network. The activities covered in variable volume maintenance are as follows.

Planned maintenance:

- modify assets – covers the altering of mains and services or decommissioning of gas mains as a result of third party or internal request;

- facilities maintenance – scheduled maintenance of network assets such as valves, corrosion protection equipment and regulators and carrying out investigations to ensure the integrity of the high pressure pipelines;
- leakage survey and pipeline patrol – involves regular survey of the network for leaks and patrolling the pipeline to monitor third party activities in close proximity of the pipelines; and
- gas meter management and refurbishment – routine changeover of commercial/industrial meters and the refurbishment of these meters for legislative compliance purposes (only new domestic meters are used for the change over program and as such the costs are capitalised); and
- retailer support services – audit of installer's work and responding to request for pressure upgrades or meter/regulator removal.

Unplanned maintenance:

- Pipeline maintenance services – refer to the repair of gas mains and services as a result of gas leaks.
- Gas faults – investigation and rectification of reports of gas leaks or no gas in domestic and commercial premises.
- Emergency support services – repairs to mains and services as a result of third party damage.

Deleted - Confidential

The cost drivers for the maintenance expenditure are related to a number of factors including:

- gas distribution licence requirements;
- safety case;
- requirements of relevant Codes and Standards (for example, AS2885, AS4645, etc);
- costs of labour and materials;
- volume of work; and
- specific service levels (for example class 1 leaks repaired within 24 hours).

[Deleted – Confidential]

Table 45 [Deleted – Confidential]

The variable volume maintenance costs have been calculated by multiplying the volume of work by the unit cost which consists of labour, material and subcontractor costs.

Work volume

The forecast work volume has been derived from reviewing the work volume in the current Access Arrangement period 2005 to 2009 and factoring in any additional workload due to network changes. **[Deleted – Confidential]**

Table 46 [Deleted – Confidential]

The forecast work volume has been estimated to be relatively constant to the historical work volume. Some of the key increases are attributable to the following scope changes:

- modify assets – the increased number of time expired domestic meters will result in an increased number of services that have to be altered for safety and other associated reasons;
- facilities maintenance – the ongoing expansion of the network has resulted in an increase in the number of assets to be maintained;
- meter management/refurbishment – is for commercial/industrial meters only; the changeover of domestic meters are now capitalised; and
- pipeline maintenance services and gas faults – there is a marginal 3% increase allowed for in both categories to reflect the ageing of the assets.

[Deleted – Confidential]

Table 47 [Deleted – Confidential]

[Deleted – Confidential]

5.2.1.4 Ancillary maintenance projects

The activities associated with this cost centre are related to the relocation of gas mains, painting of industrial gas meter sets and the payment of DBYD charges. The costs of most relocations are funded by third parties and as such have not been included in this submission.

[Deleted – Confidential]

5.2.1.5 Market Operations

The market operations cost category includes the following activities:

- market services: responsible for the interface with Retail Energy Market Operator and the provision of gas flows for balancing and settling the WA gas market, new connection process, meter reading and data management and retailer billing;
- system monitoring: responsible for the installation and maintenance of telemetry equipment used for monitoring performance of the network and large industrial meter sets;
- control room: a 24 hour operational centre responsible for the monitoring of gas pressures, dispatching crews to gas emergencies and receiving emergency calls after hours; and
- call centre: which operates during business hours taking calls for new connections.

[Deleted – Confidential]

Table 48 [Deleted – Confidential]

It is worth noting that the costs for the market operations are forecast to remain relatively constant for the forecast period despite the anticipated increase in customer numbers and geographical expansion of the network.

5.2.1.6 Support Services

[Deleted – Confidential]

Table 49 [Deleted – Confidential]

A description of each of the cost categories are covered in the sections below.

Operations management supports the operations and administration of gas distribution operations, interfacing between the Board and staff. The management team drives the implementation of WAGN strategy in the operational environment. It includes operational finance and human resource functions.

Commercial is responsible for an array of functions including billing, customer relations, coordination of metering activities, contract administration, market development, generic promotion of gas and facilities and land management.

HSEQ provides the strategic direction for all matters related to health, safety, environment and quality. The group develops and manages the HSEQR management system and ensure that WAGN staff complies with the legislative requirements.

Network Services is the group which manages the interface between operations and the provider of IT services. It includes business subject matter experts on various applications such as SAP, data warehouse and field mobility. The objective of the group is to minimise any downtime for the work force due to issues related to IT applications.

5.2.1.7 [Deleted – Confidential]

Table 50 [Deleted – Confidential]

[Deleted – Confidential]

5.3 Marketing

WAGN has developed a number of strategies to a) maintain a focus on gas as an energy source to limit the rate of reduction in gas demand and b) to investigate alternative uses for gas.

The total cost of the strategies over the third Access Arrangement period are summarised in the table below.

Table 51 [Deleted – Confidential]

These activities are discussed below.

5.3.1 Promotion of Gas

Gas consumption is forecast to continue to reduce on a per capita basis as more efficient appliances are developed. In addition, increased utilisation of solar or electricity are also expected to reduce the overall consumption.

[Delete – Confidential]

Table 52 [Deleted – Confidential]

5.3.2 Applied Research and Development

[Deleted – Confidential]

Table 53 [Deleted – Confidential]

5.4 Unaccounted For Gas

Unaccounted for Gas (UAFG) is defined as the difference between the measurement of the quantity of Gas delivered into the WAGN GDS in a given period, and the measurement of the quantity of Gas delivered from the WAGN GDS during that period.

This difference is the total effect of:

- differences 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 amounts of gas delivered from the WAGN GDS.

Measurement differences associated with the more than 600,000 meters at delivery points, and operational losses, are the main contributors to UAFG and each accounts for approximately 50% of total UAFG.

The quantity of UAFG can fluctuate significantly over short periods of time, because of the random nature of Gas measurement errors, the ratio of small use gas consumption compared to industrial consumption and seasonal fluctuations in gas consumption.

[Deleted – Confidential]

Table 54 [Deleted – Confidential]

WAGN has proposed a pass through mechanism for variations in gas commodity prices above the general rate of inflation. Gas commodity prices applicable in WA are completely outside the ability of WAGN to manage. Therefore, the pass through mechanism has been designed to enable changes in the price of gas to flow through as a change to haulage tariffs.

To establish the starting gas price for use in the forecast of costs of UAFG and subsequent escalation, WAGN has undertaken a closed tender to obtain an independent fair market rate for Gas to replace UAFG.

[Deleted – Confidential]

5.5 Information and Communication Technology

All ICT services are outsourced. The breadth of the services provided is as follows:

- planning and strategy – development of ICT Strategies and analysis of technology investment options;
- program delivery – delivery of ICT capital works programs;
- service delivery – service management, service centre (helpdesk), compliance, change management, vendor management and ICT security;
- ICT operations – operational availability of the ICT service including server maintenance and data storage; and
- application management – support resources to ensure the availability and performance of the large number of applications.

The ICT function is based on industry best practice systems and processes based on the IT Infrastructure Library (ITIL) methodology to ensure a defined, repeatable, and scalable ICT best practice framework is in place to support the business in its use of technology.

[Deleted – Confidential]

The drivers of WAGN's ICT services requirements are its regulatory requirements to support gas market retail contestability, network integrity monitoring systems, and a call centre to interface with "Dial Before You Dig" as well as leaks, connections and disconnections notifications.

Table 55 [Deleted – Confidential]

5.5.1 [Deleted – Confidential]

5.5.2 [Deleted – Confidential]

5.5.3 [Deleted – Confidential]

5.5.4 [Deleted – Confidential]

5.5.5 [Deleted – Confidential]

5.5.6 [Deleted – Confidential]

5.6 Corporate Costs 2010 – 2014

Corporate costs reflect the costs associated with executive and strategic functions.

Table 56 [Deleted – Confidential]

5.6.1 Strategy and governance

The activities which comprise strategy and governance are detailed below.

Table 57 [Deleted – Confidential]

Compliance

WNG Compliance provides a monitoring and enhancement service that complements the compliance conducted at an operational level. The program is in conformance with Australian Standard AS 3806 – 2006 – Compliance Programs and is an important element of the company's governance framework. Compliance aims to prevent and where necessary, identify and respond to, non-compliance with the Company's obligations under laws, regulations, codes, undertakings and its own organisational standards.

Risk and audit

The risk and audit group plans, executes and monitors the approved internal audit plans. The group also facilitates and coordinates risk management practices.

Corporate affairs

The corporate affairs group is responsible for all strategic communication advice to senior management, manages the government relations, provides crisis communication services and manages the company brand.

Legal and insurance

The legal and insurance group provides company secretarial, general legal advice on contract terms, haulage contract agreements and any other legal regulatory matters. It also arranges and manages the comprehensive insurance coverage portfolio including WAGN Specific Asset Insurances (Industrial Special Risk, Property and Liability, Directors and Officers), Professional Indemnity, Employment Practice Liability, motor vehicle and workers compensation.

5.6.2 HSEQ

HSEQ is responsible for the development of HSEQ policies, procedures and plans. The group is also responsible for maintaining the following accreditation:

- ISO AS/NZS 9001:2008 Quality Management Systems;
- ISO AS/NZS 14001:2008 Environmental Management Systems; and
- AS/NZS 4801:2008 Occupational Health and Safety Management Systems.

HSEQ services at an operational level are captured in support services under Operations Costs.

5.6.3 Human Resources

This group is responsible for the development of strategic human resource policies, procedures and plans. It provides advice on remuneration and organisation capability direction. Human resource services at an operational level are captured in Support Services under Operations Costs.

[Deleted – Confidential]

Table 58 [Deleted – Confidential]

5.6.4 Finance

The focus of the Finance group is listed below. Finance services at an operational level are captured in Support Services under Operations Costs.

Table 59 [Deleted – Confidential]

Fleet management

Fleet Management manages the purchase of motor vehicles, provides guidance on associated responsibilities for the fleet vehicles and cost management services across the whole fleet.

Taxation

Taxation is responsible for all corporate tax planning and advice. The group also develops tax policies and tax risk management and is responsible for all the day to day administration of taxation matters such as FBT and GST.

Treasury

Treasury is responsible for ongoing financial risk management and maintaining adequate capital funding for WAGN. The group is also responsible for audit and compliance reporting on Treasury services.

Planning and investment

Planning and Investment is responsible for commercial financial analysis and corporate modelling support services as required and inputs to long term Business / Strategic Planning.

Corporate and systems accounting

Corporate and Systems Accounting includes the management of credit cards and employee expense claims, debtors invoicing, receipting and collections and the procurement policy; day to day support for the finance team using SAP system, implements new financial initiatives and provides advice on financial processes, systems and policies; and day to day activities associated with payroll, superannuation and termination payments.

5.6.5 Accommodation/Building Services

The majority of building services costs relate to the city based accommodation costs. Other building services costs included in this category are listed below.

- travel vendor management;
- head office security management;
- common office supply contracts vendor management (multifunction devices procurement; stationery);

- head office reception and administration services;
- head office property management.

5.7 Regulatory Costs

The regulatory cost forecasts are made up of four elements regulatory fees, technical compliance, access arrangement costs, and the regulatory and compliance team.

Table 60 [Deleted – Confidential]

5.7.1 Regulatory Services

The Regulatory Services team was established in 2008 from a zero base as a result of the sale and split of the Alinta group of companies. It is responsible for compliance with economic regulatory obligations.

5.7.2 Technical compliance

Technical compliance monitors WAGN's compliance against all relevant Australian standards particularly AS2885 and AS/NZS4645.

5.7.3 Regulatory fees/levies

Regulatory fees are fees payable to regulatory bodies such as the ERA, Energy industry ombudsman, the Gas Disputes Arbitrator and the Department of Consumer & Employment protection. All of the forecasts are based on existing billings or forecasts provided by from the relevant party.

5.8 Compliance with Rule 91(1)

WAGN considers that its forecast of operating expenditure complies for the period 2010 to 2014 is consistent with the requirements of the Rule 91(1) for the following reasons:

Prudent – the operating expenditure has been forecast based on the requirements to provide distribution services to retailers' and retailers' customers which include the following activities:

- ensuring that the network is maintained in accordance with the relevant Australian standards and manufacturers' recommendations;
- provide a capability to manage any gas emergencies in accordance with WAGN's safety case;

- provide metering and billing services and other services related to full retail contestability;
- manage the ICT functions to support the distribution services; and
- provide a corporate function to support the functions of a distribution business.

Efficient – the forecast costs are based on contractors' rates, labour rates and suppliers' material costs;

Good Industry Practice – maintenance practices are in accordance with the relevant Australian standards and manufacturers' recommendations. Distribution activities comply with the requirements of the relevant legislations and as appropriate the Gas Safety Case. The ICT assets are operated and maintained in accordance with the ICT industry practices and the corporate functions such as human resources, finance and regulatory functions are carried out to sustain the distribution business.

To achieve the lowest sustainable costs of delivering pipeline services – WAGN has forecast its costs based on a ground up approach to maintain the distribution services. It has used contractors to manage variations in workloads. In relation to its ICT costs, vendor supported applications are used where possible. Its corporate costs are consistent with other utilities and as required to sustain a complex distribution business. These factors demonstrate that the forecast expenditure is what is required to achieve the lowest sustainable costs for delivering pipeline services.

6 OPENING CAPITAL BASE AND PROJECTED CAPITAL BASE

The projected capital base for the third access arrangement period is, in accordance with Rule 78, to be determined as:

- the opening capital base for the third access arrangement period;

plus:

- forecast conforming capital expenditure for the third access arrangement period;

less:

- forecast depreciation for the third access arrangement period; and
- the forecast value of pipeline assets to be disposed of in the course of the third access arrangement period.

The determination of the opening capital base for the third access arrangement period is summarized in Table 61. Forecast conforming capital expenditure for the third Access Arrangement Period is summarized in section 6.1, and forecast depreciation is summarized in section 6.2.

No pipeline assets of material value are expected to be disposed of during the third access arrangement period.

6.1 Forecast conforming capital expenditure

Table 61 shows forecast conforming capital expenditure during the third access arrangement period.

Table 61 Forecast conforming capital expenditure 2010(1)–2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
High pressure mains	9.577	4.168	7.008	10.663	10.289
Medium pressure mains	0.000	0.000	0.000	0.000	0.000
Medium/low pressure mains	6.932	12.534	13.232	13.675	16.094
Low pressure mains	0.000	0.000	0.000	0.000	0.000
Regulators	0.668	0.261	0.229	0.267	0.203
Secondary gate stations	2.006	0.424	0.000	0.000	0.000
Buildings	0.454	2.305	6.691	0.000	0.000
Meters and service pipes	7.530	16.311	18.947	20.422	22.579
Equipment and vehicles	0.000	4.472	0.000	0.000	0.637
Information technology	1.483	4.641	3.474	5.021	1.635
Full retail contestability	0.000	0.000	0.000	0.000	0.000
Land	0.000	0.000	0.000	0.000	0.000
Total	**28.650**	**45.116**	**49.581**	**50.048**	**51.437**

Expenditures on meters and service pipes are the largest component of forecast capital expenditure. These expenditures are, primarily, to facilitate the connection of the forecast numbers of new customers shown in section 6 of this Access Arrangement Information.

Significant expenditures are also forecast for reinforcement of those parts of the WAGN GDS which will become capacity constrained during the Third Access Arrangement Period. The requirements for reinforcement have been determined using the volume and customer numbers forecasts shown in section 6 of this Access Arrangement Information, and from information from the Department of Planning and Infrastructure on the geographical expansion of the Perth metropolitan area.

As a prudent service provider, WAGN constructs new pipelines as new areas are opened to urban and industrial/commercial development. Planning and pipeline construction when these new areas are "greenfields" sites facilitates efficient network expansion at the lowest sustainable cost. The additional costs once roads, buildings and other infrastructure are in place are high (they can double the total cost of pipeline construction). The costs of this reinforcement work are, nevertheless, relatively high because land development is expected in areas which are not close to the existing high and medium pressure mains from which they will be supplied.

6.2 Forecast depreciation

For each of the classes of assets which comprise the WAGN GDS, forecast depreciation for the third access arrangement period has been calculated using the straight line method.

The straight line method has been applied using the economic lives and, for the assets of the initial capital base, the remaining economic lives, which are set out in Table 62.

Table 62 Asset lives

	Economic life (Years)	Remaining life (Years at 31 December 2009)
High pressure mains	120	95
Medium pressure mains	60	40
Medium/low pressure mains	60	30
Low pressure mains	60	22
Regulators	40	17
Secondary gate stations	40	14
Buildings	40	13
Meters and service pipes	25	0
Equipment and vehicles	10	-
Information technology	5	-
Full retail contestability	5	-

The forecast of depreciation for the third access arrangement period is shown in Table 63.

Table 63 Forecast depreciation 2010(1)–2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
High pressure mains	0.885	2.229	2.264	2.322	2.411
Medium pressure mains	1.756	5.545	5.545	5.545	5.545
Medium/low pressure mains	2.161	4.432	4.640	4.861	5.089
Low pressure mains	0.044	1.195	1.195	1.195	1.195
Regulators	0.256	0.603	0.609	0.615	0.622
Secondary gate stations	0.048	0.203	0.214	0.214	0.214
Buildings	-0.016	0.053	0.104	0.271	0.271
Meters and service pipes	3.863	8.021	8.674	9.431	10.248
Equipment and vehicles	-3.417	0.585	0.650	0.650	0.650
Information technology	-5.254	1.484	2.404	3.099	3.878
Full retail contestability	0.000	0.000	0.000	0.000	0.000
Land	0.000	0.000	0.000	0.000	0.000
Total	**0.326**	**24.350**	**26.299**	**28.203**	**30.123**

6.3 Projected capital base

The determination of the projected capital base for the third access arrangement period is set out in Table 64.

Table 64 Projected capital base 2010(1)–2013/14 ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
Capital base	**788.188**	**815.930**	**836.696**	**859.979**	**881.823**
PLUS:					
Conforming capital expenditure	28.070	45.115	49.582	50.048	51.437
	816.257	861.045	886.278	910.027	933.260
LESS:					
Depreciation	0.328	24.349	26.299	28.203	30.123
Forecast asset disposals	0.000	0.000	0.000	0.000	0.000
	0.328	24.349	26.299	28.203	30.123
Capital value of assets at end of year	815.930	836.696	859.979	881.823	903.137

7 RETURN ON THE PROJECTED CAPITAL BASE

7.1 Requirements of the National Gas Law and the National Gas Rules

When exercising a discretion in approving or making those parts of an access arrangement relating to a reference tariff, the regulator must take into account the revenue and pricing principles of section 24 of the NGL (NGL, section 28(2)). Section 24(2) requires that a service provider be provided with a reasonable opportunity to recover at least the efficient costs which it incurs in:

- providing reference services; and
- complying with a regulatory obligation or requirement or making a regulatory payment.

The efficient costs which a service provider can be expected to incur will include the efficiently incurred costs of financing the assets used to provide reference services. These efficiently incurred financing costs may be recovered through reference tariffs which, in accordance with section 24(5) of the NGL, allow for returns which are commensurate with the regulatory and commercial risks involved in providing the reference services to which those reference tariffs relate.

The returns for which the reference tariffs should allow can be provided through inclusion of a return on investment – a return on the projected capital base – in the total revenue of a covered pipeline system (Rule 76). That return can be determined as the product of a rate of return and the capital base (although neither the NGL nor the NGR is explicit on this matter).

Rule 87(1) establishes a criterion for the setting of a rate of return. The rate of return to be used in determining total revenue and reference tariffs:

. . . is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing the reference services.

This criterion appears to be broadly consistent with the requirements of section 24(5) of the NGL.

A rate of return which is commensurate with prevailing conditions in the market for funds and the risks involved in providing the reference services is not directly observable, and must be determined through a process of estimation. Rule 74(2) requires that any estimate made for price or revenue regulation be arrived at on a reasonable basis. The estimate must also be the best estimate possible in the circumstances.

Rule 87(2) guides the process of estimation required in applying the criterion of Rule 87(1).

Rule 87(2) requires that certain principles and methods be used in determining the rate of return. In particular:

- the rate of return is to be established using a well accepted approach, such as a weighted average cost of capital (WACC), which incorporates the costs of equity and debt; and
- a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.

The application of these principles and methods requires judgements about a number of factors, and different judgements can be expected to lead to different rates of return. Rule 87(2) therefore restricts, in two ways, the range of judgements which can be made. They must be the judgements which would be made about a service provider which:

- achieves benchmark levels of efficiency; and
- meets benchmark standards as to gearing and other financial parameters.

In this section of this submission WAGN sets out the way in which it has determined, in accordance with the requirements of Rule 87, a rate of return for use in determining the total revenue and proposed revised reference tariffs for the WAGN GDS.

7.2 Rate of return determined using a weighted average cost of capital

The rate of return for the WAGN GDS has been determined using a weighted average of the costs of the equity and debt which would be used by an efficient service provider to finance investment in assets which comprise a pipeline system.

In the absence of an imputation tax system, the nominal post-tax form of the WACC is:

$$WACC_{\text{nominal post-tax}} = E(r_e) \times E/V + E(r_d) \times (1 - t) \times D/V,$$

where:

- $E(r_e)$ is the nominal post-tax expected rate of return on equity;
- E/V is the proportion of equity in the total financing of the pipeline system;
- $E(r_d)$ is the nominal pre-tax expected rate of return on debt;

- t is the tax rate; and
- D/V is the proportion of debt in the total financing of the pipeline system.

Australian taxation law requires the payment of tax by corporations, recognises shareholder payment of tax on dividends as involving double taxation of the same income stream, and provides credits to shareholders for tax already paid at the corporate level. In these circumstances, the calculation of the WACC must be modified to properly represent the additional element of shareholder return available through the taxation system, and Monkhouse has proposed that the nominal post-tax WACC be calculated using the formula:

$$WACC_{\text{nominal post-tax}} = E(r_e) \times (1 - t) \times 1/[1 - t \times (1 - \gamma)] \times E/V + E(r_d) \times (1 - t) \times D/V,$$

where γ (gamma) is the proportion of tax collected at the corporate level which is to be credited against personal tax payments (γ is a measure of the value of imputation credits).[3]

The equivalent nominal pre-tax WACC can be obtained by dividing the right hand side of the formula for the nominal post-tax WACC by 1 – t:

$$WACC_{\text{nominal pre-tax}} = E(r_e) \times 1/[1 - t \times (1 - \gamma)] \times E/V + E(r_d) \times D/V.$$

A real pre-tax WACC is then obtained by removing expected inflation from the nominal pre-tax WACC:

$$WACC_{\text{real pre-tax}} = (1 + WACC_{\text{nominal pre-tax}})/(1 + \pi_e) - 1,$$

where π_e is the expected rate of inflation.

A real pre-tax WACC, calculated in the way described above, was used in determining the rates of return for the WAGN GDS which were used, in turn, to determine the reference tariffs applicable in prior access arrangement periods. WAGN has now used a real pre-tax WACC, calculated in this way, to determine a rate of return for use in determining the total revenue and reference tariffs for the revisions to the Access Arrangement.

Use of a real pre-tax WACC, calculated in the way described above, to determine the rate of return requires estimates of:

[3] See Peter H. L. Monkhouse (1997), "Adapting the APV valuation methodology and the beta gearing formula to the dividend imputation tax system", Accounting and Finance, 37: 69-88.

- D/V – the gearing (the proportion of debt in the total financing of the pipeline system);
- t – the corporate tax rate;
- γ – gamma, the value of imputation credits;
- $E(r_d)$ – the nominal pre-tax expected rate of return on debt;
- $E(r_e)$ – the nominal post-tax expected rate of return on equity; and
- π_e – the expected rate of inflation.

The estimates of these parameters which WAGN has made, and the bases on which these estimates have been made, are set out in sections 7.4 to 7.11 of this submission. WAGN's calculation of a real pre-tax WACC is described in section 7.12, and determination of the rate of return is discussed in section 7.13.

On 1 May 2009, the Australian Energy Regulator (AER) issued a Final Decision following its review of WACC parameters for the electricity industry.[4] The AER's review of WACC parameters was undertaken in accordance with the requirements of the National Electricity Rules. A number of the national regulator's findings were, therefore, in respect of matters specific to those rules, and to the electricity industry. However, some of the findings have wider implications and, in particular, implications for the estimates which must be made when determining a rate of return for a gas pipeline system. Relevant findings from the AER's review are noted in the next section of this submission.

7.3 AER WACC Decision

Six matters dealt with by the AER are relevant to gas pipeline systems and, in particular, to determination of a rate of return for the WAGN GDS. These six matters are:

- the gearing of a benchmark efficient service provider;
- the appropriate estimate for gamma;
- service provider credit rating;
- use of yields on Commonwealth Government securities with terms to maturity of 10 years for calculation of a nominal risk free rate of return;
- the market risk premium; and

[4] Australian Energy Regulator, *Final Decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009.

- equity beta;

Gamma, the nominal risk free rate, and the market risk premium were all parameters which the AER determined from economy-wide, rather than industry-specific, factors. The AER's decisions on them are as relevant to the regulation of gas pipeline systems as they are to the regulation of electricity networks.

The AER's decisions on gearing, service provider credit rating and equity beta are intended to be industry-specific. However, because there is only a small number of electricity network service providers, the national regulator based its reasoning in respect of these parameters on data from samples comprising both electricity and gas businesses. In consequence, the AER's findings have relevance for the setting of a rate of return for a gas pipeline system.

7.3.1 Gearing

In their decisions, Australian regulators have determined that the benchmark gearing for efficient electricity network service providers, and for efficient gas pipeline service providers, is 60%. Gearing of 60% was determined, by the ERA and by its predecessor, the Western Australian Independent Gas Pipelines Access Regulator, to be the efficient level of gearing for the WAGN GDS.

On the basis of its review of recent capital structure data for both electricity and gas businesses, the AER concluded that a change in the gearing benchmark was not warranted.

7.3.2 Gamma: valuation of imputation credits

In its May 2009 Final Decision, the AER set the value of imputation credits – gamma – at 0.65. This was a significant change from the previously assumed value of 0.50. It indicated a view on the estimates of certain financial parameters which was very different from the view presented by the Joint Industry Association (representing electricity network and gas pipeline service providers) in its submissions to the AER both before and after the regulator's December 2008 Draft Decision. The Joint Industry Association, proposed a value of gamma of 0.20, and provided evidence supporting that value.

7.3.3 Service provider credit rating

When the rate of return is established as a WACC, an estimate must be made of the cost of debt. In the setting of regulated access prices, the cost of debt has usually been estimated as the sum of the nominal risk free rate of return and a debt risk premium, with the debt risk premium being the premium payable by a service provider with a specified benchmark credit rating. In its December 2008 Draft Decision, the AER argued that

recent evidence, from a sample of electricity network and gas pipeline service providers, supported a change in the benchmark service provider credit rating from BBB+ to A-.

Service providers contested this change in credit rating in submissions made following release of the Draft Decision. In its May 2009 Final Decision, the AER noted that median credit rating for energy networks was A-, but conceded that, when appropriate comparators were selected, the credit rating was BBB+. The national regulator's Final Decision retained the benchmark credit rating of BBB+.

7.3.4 Nominal risk free rate of return

The Australian Competition and Consumer Commission (ACCC), the national regulator in the energy sector before the establishment of the AER, argued in its decisions that, for the purpose of determining a rate of return, the nominal risk free rate of return should be estimated by averaging, over a period of 10 to 40 trading days, yields on Commonwealth Government securities with terms to maturity of five years. In their revenue and pricing proposals submitted to the ACCC, and subsequently to the AER, regulated businesses had proposed that the nominal risk free rate be estimated by averaging yields on Commonwealth Government securities with terms to maturity of 10 years.

In its December 2008 Draft Decision, the AER continued the arguments of the ACCC for estimating the nominal risk free rate as an average of the yields on Commonwealth Government securities with terms to maturity of five years. In its May 2009 Final Decision, the AER advised that, having regard to submissions made in response to the Draft Decision, there was not persuasive evidence which would justify a departure from a 10 years term assumption for estimation of the nominal risk free rate of return.

7.3.5 Market risk premium

The market risk premium (MRP) is the premium above the nominal risk free rate which investors require for investment in a market portfolio of risky assets. It is used in estimating the rate of return on equity.

In its May 2009 Final Decision, the AER argued that, prior to the onset of the global financial crisis, a long term average of risk premia of 6.0% was the best estimate of a forward looking MRP. However, as a result of the crisis, risk premia were much higher than the long term average. This was a situation which the AER thought might evolve in one of two ways:

- the MRP will return to the long term average over time, or
- there had been a "structural break", and the forward looking MRP will be above the previously prevailing long term average.

The AER concluded that, although the outcome could not be known at present, both scenarios suggested that a MRP above 6.0% was, at this time, reasonable. The AER did not consider the available evidence supporting a MRP significantly above 6.0% but, having regard to the desirability of regulatory certainty and stability, an estimate of 6.5% was reasonable.

7.3.6 Equity beta

The *National Electricity Rules* mandate use of the Sharpe-Lintner Capital Asset Pricing Model (Sharpe-Lintner CAPM) for calculation of the expected rate of return on equity used to finance investment in electricity networks. In the Sharpe-Lintner CAPM, the expected rate of return on equity (E(r)) is the sum of the nominal risk free rate (r_f) and a risk premium. The risk premium is the product of the MRP and an industry-specific or firm-specific risk adjustment factor, the equity beta (β).

In December 2008, the AER indicated, in its Draft Decision, that it was proposing to set the equity beta to be used in determining the rate of return required under the National Electricity Rules at 0.8. This was a significant lowering of beta from the values of 1.0 for transmission, and 0.9 for distribution, which were previously required, and which service providers had argued should be retained.

Support for the proposed value of beta was provided by research which the AER commissioned from Melbourne University econometrician, Associate Professor Olan Henry. Henry's estimation of beta, from share price data for both electricity and gas utilities, was an important departure from the approach taken in previous regulatory decisions. Henry estimated beta using well established statistical methods which were applied to a clearly specified data set. Beta was not, as had previously been the case, estimated through a process in which regulators relied on their own judgements, and the judgements of their financial advisors, tempered to some extent by arguments advanced by service providers.

Using a number of estimation techniques, Associate Professor Henry ascertained that the equity beta for a portfolio of Australian energy utilities, the shares of which were traded, was in the range 0.44 to 0.68.

The AER therefore argued, in its Draft Decision, that:

- there was persuasive evidence for departure from the previously assumed values of beta of 1.0 and 0.9; and
- a beta of 0.8 is supported by the empirical evidence, is appropriate in current market conditions, and is likely to promote efficient investment in facilities required for the provision of electricity network services.

The AER's position was the subject of industry challenge in the process of public consultation which followed release of its Draft Decision. In response, the national regulator had Associate Professor Henry review and update certain aspects of his work. However, Henry made few changes to his methods, and did not substantially alter his earlier conclusion (arguing that the evidence continued to point towards an estimate of beta lying in the range 0.4 to 0.7).

Despite the industry challenge, the AER maintained its position in its Final Decision. The data indicated an equity beta in the range 0.4 to 0.7 but, in current market conditions, a beta of 0.8 was appropriate for use in estimating the expected rate of return on the equity used to finance investments in electricity network assets.

7.4 Applying Rule 87(2): gearing

In applying Rule 87(2) to guide determination of the rate of return for the WAGN GDS, WAGN has used gearing (ratio of debt to total financing) of 60%.

WAGN's assumption is consistent with the AER's decision on the gearing of a benchmark efficient service provider (in electricity or gas), and is consistent with the gearing assumed by the ERA in its previous access pricing decisions for the WAGN GDS, and for other regulated assets in the energy sector.

7.5 Applying Rule 87(2): tax rate

WAGN has used a tax rate of 30% in determining the rate of return for the WAGN GDS. This is consistent with the ERA's prior practice of using the corporate tax rate as the rate appropriate for the setting of access prices for benchmark efficient service providers.

7.6 Applying Rule 87(2): nominal risk free rate of return

The nominal risk free rate of return is required for calculation of the expected rates of return on equity and on debt which are to be averaged in applying Rule 87(2).

The nominal risk free rate of return is a theoretical construct (the return on an "ideal" risk free asset), and cannot be measured directly. In consequence, in applying Rule 87(2), consideration must be given to:

- choice of a proxy for the (theoretical) asset which yields a risk free rate of return; and
- the period over which the return on the proxy – the estimate of the risk free rate of return – is to be measured.

WAGN has used as a proxy for the risk free asset Commonwealth Government securities with terms to maturity of 10 years.

WAGN has approximated the risk free rate of return using daily yield data, reported by the Reserve Bank of Australia, for Commonwealth Government securities with terms to maturity of 10 years.

In an ideal world, the nominal risk free rate would be determined from the most recent available yields on Commonwealth Government securities. Yields reported today incorporate the latest market information and expectations about future rates. The world is not, however, ideal, and today's reported yields (like yesterday's) contain a random component ("noise"). Some averaging of yields should reduce the effect of this noise on the estimate of the risk free rate of return, with longer-term averages achieving better noise reduction. However, longer term averaging introduces a bias because greater weight is given to superseded prior expectations.

WAGN has therefore averaged, over a period of 20 trading days, the yields on Commonwealth Government securities with terms to maturity of 10 years to obtain an estimate of the risk free rate of return. The yields which WAGN has averaged were those reported by the Reserve Bank of Australia for the 20 trading days to 13 November 2009. The average – WAGN's estimate of the real risk free rate – is 5.59%.

WAGN's approach to estimation of the nominal risk free rate of return is consistent with the AER's decision on the setting of that rate for the regulation of network access prices in the national electricity market. It is also consistent with the approach required by the ERA in its previous access pricing decisions for the WAGN GDS, and for other regulated assets in the Western Australian energy sector.

7.7 Applying Rule 87(2): market risk premium

In its May 2009 Final Decision on WACC parameters for use in determining prices for access to electricity networks, the AER had noted the deviation of the then current MRP from its long term average of around 6.0%. The national regulator argued that, the future path of the MRP was not known and might evolve in one of two ways: the MRP may return to its long term average over time, or it may remain above the long term average as a consequence a "structural break" in the economic processes generating the premium. The AER concluded that a MRP above 6.0% now seemed appropriate and, having regard to the desirability of regulatory certainty and stability, an estimate of 6.5% was reasonable. A premium of 6.5% was also commensurate with conditions in the market for funds which were likely to prevail when the results of its review were to be applied in the setting of regulated access prices.

The AER provided no evidence to support these conjectures.

It provided no evidence of a fundamental change in economic relationships of the type which would imply a "structural break", and which might mean that the MRP will not return to its long term average.

In the absence of any evidence for a structural break, it is reasonable to assume – as, in fact, the AER assumed – that the MRP can be expected to return, over time, to around 6.0%. Indeed, this is consistent with the view implicit in the AER's previous use of the long term average as an estimate of the market risk premium. After previous severe financial crises (in the early 1930s, in the 1950s, in the mid 1970s, in the early 1908s and in the early 1980s) the economy appears to have returned to conditions which have allowed the regulator to take the view that there has been no "structural break" and the long term average provides a reasonable estimate of the MRP.

In November 2009, the MRP was around 12% indicating the considerable uncertainty in financial markets engendered by the global financial crisis. Assuming that the MRP will return to its long run average, there is an important question about the time this reversion to the mean is likely to take. If the MRP takes several years to revert to its long term average, the current long term average will significantly underestimate the MRP during the period of the Access Arrangement for the WAGN GDS. Whether an appropriate estimate of the MRP is 6.5%, as the AER claims, or whether it is a higher number, depends on the time over which the MRP falls, and over which the long term average returns to around 6.0%. The AER provides no evidence which might allow these issues to be decided.

WAGN is of the view that the return of the MRP to values consistent with the long term average is unlikely to be rapid. A severe financial crisis affects asset markets for three to five years after the events which precipitate the crisis.[5]

Estimation as a long term average of historical excess returns is not, then, a reasonable basis of estimation for the MRP, and will not provide the best estimate in the circumstances.

WAGN has therefore sought the assistance of Value Advisor Associates in estimating the MRP for the period during which the revisions to the Access Arrangement for the WAGN GDS are expected to apply.

From an assessment of the forward view of volatility implicit in the pricing of options on the ASX 200 index, and from a review of bond yields, Value Advisor Associates have established that the MRP is likely to be in the range 8% to 10% during the period 2011 to 2015. **[Deleted – Confidential]**

[5] See Carmen M Reinhardt and Kenneth S Rogoff (2000), "The Aftermath of Financial Crises", American Economic Review: Papers and Proceedings, 99(2): 466-472.

To determine the rate of return to be used in determining the total revenue and revised reference tariffs for the WAGN GDS, WAGN has therefore used an estimate of 8.0% for the MRP.

7.8 Applying Rule 87(2): value of imputation credits

As noted above, the AER set the value of gamma to be used in determining rates of return for regulated network service providers in the national electricity market at 0.65. The national regulator estimated gamma as the product of:

- the fraction of the imputation credits created which is distributed to shareholders (the payout ratio, F); and
- the ratio of market value of the imputation credits distributed to their face value (θ).

The value of 0.65 was obtained by the AER:

- assuming that the payout ratio is 1.0;
- using tax statistics to estimate an upper bound of 0.74 for θ; and
- adopting an estimate of 0.57 for the lower bound on θ.

These estimates for F and θ imply a value of gamma which lies in the range 0.57 to 0.74. The midpoint of this range – the AER's estimate of gamma – is 0.65.

WAGN reviewed the AER's decision on gamma, and found that the information available to the national regulator did not support the range of 0.57 to 0.74, and did not support a point estimate of 0.65. In particular:

- there was evidence which indicated that the value of the payout ratio was less than 1.0;
- properly interpreted, tax statistics could not be used to estimate θ; and
- studies other than the one referred to by the AER pointed to a lower bound for θ which was below 0.57.

In view of these findings, WAGN engaged NERA Economic Consulting (NERA) to provide it with expert opinion on the estimation of gamma.

NERA obtained statistics from the Australian Taxation Office showing that the fraction of imputation credits created which is distributed to shareholders averaged 0.68 during the

period from 1996/97 to 2006/07. These data do not support a view that the payout ratio should be 1.0.

In setting a value of 0.65 for gamma, the AER relied on advice from Melbourne University Associate Professor John Handley that data on imputation credit redemption rates from the Australian Taxation Office could be used to provide a reasonable upper bound on θ. NERA has argued, and WAGN has accepted, that redemption rates overestimate the value of θ because:

- the value investors place on imputation credits cannot be measured as a holdings-weighted average; it is more likely to be a wealth-weighted average; and
- redemption rates do not take into account the costs investors incur in accessing imputation credits.

NERA advised that, in these circumstances, the value of imputation credits is most appropriately estimated from dividend drop-off studies. The AER, however, relied on only one such study in its setting the value of gamma when several studies were available. NERA ascertained that, when these studies were calibrated to ensure consistency in the treatment of dividends, the estimate of θ which they provided was zero. If dividends were valued at less than their face value, the value of θ is between 0.37 and 0.57.

On the basis of the advice it received from NERA, WAGN has adopted a value of 0.70 for the payout ratio, and has assumed a value of θ in the range 0.0 to 0.57. These estimates for F and θ imply a value of gamma which lies in the range 0.0 to 0.40. The midpoint of this range – 0.20 – is the estimate of gamma which WAGN has used in applying Rule 87(2) to guide the setting of the rate of return for the WAGN GDS.

[Deleted –Confidential]

7.9 Applying Rule 87(2): expected rate of return on debt

In applying Rule 87(2) to guide the determination of the rate of return, WAGN has estimated a nominal pre-tax return on debt as the sum of three components:

- the nominal risk free rate of return;
- a debt risk premium; and
- an allowance for debt raising costs.

Calculating the return on debt as the sum of the nominal risk free rate and the debt risk premium is the approach adopted by the AER in its May 2009 Final Decision. It is also the approach which has been adopted by other regulators in their access pricing

decisions. Some of those regulators, including the ERA, have allowed, in addition to the risk free rate and the debt risk premium, inclusion of a third component in the rate of return on debt. That third component is an allowance for debt raising costs.

The debt risk premium is the premium above the nominal risk free rate which would be paid by a benchmark efficient service provider. Such a service provider is assumed to have a credit rating of BBB+. This is the rating adopted by the AER in its May 2009 Final Decision. It is also the credit rating which has been assumed by other regulators, including the ERA, in their access pricing decisions.

Debt risk premia vary over time and must be estimated from current market data. In the past, these data have been obtained from financial information services Bloomberg and CBASpectrum. Estimates made from the limited data available from both of these services have recently been questioned by Australian regulators, and by service providers. Nevertheless, these data appear to be the only extensive data (data for more than one debt issue) generally available for estimation of debt premia.

WAGN has sought the assistance of capital markets advisor Second Opinion Financial Advisory with interpretation and assessment of the available data, and with estimation of the debt risk premium. **[Deleted – Confidential]**

Using data available at 13 November, Second Opinion Financial Advisory estimated a debt risk premium of 4.50% for a business with credit rating BBB/BBB+. WAGN has used this estimate to determine the rate of return used in determining the total revenue and revised reference tariffs for the WAGN GDS.

WAGN has also included in its estimate of the cost of debt an allowance for debt raising costs comprising:

- 12.5 basis points for debt facility establishment costs; and
- an annualised allowance of 16.3 basis points for recovery of “pre-financing” costs.

In its previous access pricing decisions, the ERA has allowed 12.5 basis points in the cost of debt as an annualised allowance to recover service provider debt facility establishment costs.

Ratings agencies now expect that businesses with significant debt portfolios, which require periodic refinancing, have the refinancing in place at least three months before existing facilities terminate. Businesses which cannot show that refinancing has been secured in advance of existing facility termination face the risk of unfavourable credit assessment and potentially higher borrowing costs. However, early refinancing, imposes its own pre-financing costs. Second Opinion Financial Advisory has estimated that these

pre-financing costs are likely to add about 16.3 basis points to the annual cost of debt refinancing. **[Deleted – Confidential]**

The nominal pre-tax rate of return on debt – the cost of debt used to finance a benchmark efficient service provider – is, in these circumstances:

$E(r_d) = r_f + DRP + \kappa$,

where r_f is the nominal risk free rate of return, DRP is the debt risk premium, and κ is the allowance for debt raising costs.

Using the estimate which WAGN has made of the nominal risk free rate (see section 7.4 above), its estimate of the nominal pre-tax rate of return on debt is:

$E(r_d) = 5.59\%+4.50\%+0.125\%+0.163\% = 10.38\%$.

7.10 Applying Rule 87(2): expected rate of return on equity

Estimation of the expected rate of return on equity – the service provider's cost of equity – is critical to determination of a rate of return. The expected rate of return on equity is not directly observable. All that can be observed are past – realized – returns. These realized returns may, however, be used to estimate the parameters of an appropriately constructed model of the economic processes which generate expected rates of return on equity.

The processes which generate expected rates of return on equity, and expected rates of return on financial assets generally, are a major focus of research in economics. Not only are they important for the understanding of individual and corporate financial decision making. They are central to an understanding of the role financial markets in short term macroeconomic instability and in long term economic growth.

WAGN notes the results of some of this research in this section of this submission. A necessarily brief review of the now extensive literature on the Sharpe-Lintner CAPM, Black's CAPM, intertemporal capital asset pricing, and the Fama-French three factor model, informs the view on a well accepted financial model for estimating the expected rate of return on equity which is presented at the end of the section.

7.10.1 Sharpe-Lintner CAPM

Work by William Sharpe, John Lintner and others during the 1960s initiated current thinking on the pricing of financial assets and, in particular, on the estimation of expected rates of return on equity. The principal result of this work, the Sharpe-Lintner CAPM,

explains the expected rate of return, $E(r_i)$, on any financial asset i in terms of the rate of return on a risk free asset, r_f, and a premium for risk, $(E(r_m) - r_f) \times \beta_i$:

$E(r_i) = r_f + (E(r_m) – r_f) \times \beta_i$.

$E(r_m)$ is the expected rate of return on a market portfolio of assets, the term $E(r_m) – r_f$ is the MRP, and β_i is the equity beta of asset i.

The Sharpe-Lintner CAPM is derived by assuming that investors choose, at a point in time, portfolios of financial assets which yield returns one period later. The return on a portfolio is not known with certainty at the time the portfolio is chosen, but all investors are assumed to know the true probability distribution of returns at the end of the period. That is, all investors have the same information; there are no information asymmetries.

Each investor is assumed to be able to rank all of the available portfolios of financial assets in terms of the means and variances of the uncertain returns on those portfolios. Each investor is assumed to be risk averse, trading off higher returns for lower risk, by choosing a portfolio which has minimum return variance given the mean – or expected – return.

In choosing their portfolios, investors act as price takers in competitive asset markets. In transacting in these markets they do not incur transaction costs or taxes. Investors are constrained by their wealth but they are otherwise unrestricted in choosing the portfolios which they prefer. An investor may take a long or short position of any size in any financial asset, including the risk free asset, and every investor may borrow or lend any amount at the risk free rate of return.

Early empirical work on the Sharpe-Lintner CAPM indicated that it broadly explained the behaviour of asset prices: high beta shares tended to have higher returns than low beta shares, and the relationship between rate of return and share price was "roughly linear". However, the slope of the relationship between rate of return and beta appeared to be less than the slope implied by the Sharpe-Lintner CAPM, and the model appeared to "explain" only a small percentage of the variation in rates of return.[6, 7]

[6] Empirical studies of the Sharpe-Lintner CAPM are reviewed in John Y Campbell, Andrew W Lo and A Craig MacKinlay (1997), *The Econometrics of Financial Markets*, Princeton: Princeton University Press; John Y Campbell (2000), "Asset Pricing at the Millennium", Journal of Finance, 55(4): 1515-1567, and John H. Cochrane, *Asset Pricing*, revised ed., Princeton: Princeton University Press.

[7] See Ravi Jagannathan and Zhenyu Wang (1996), "The Conditional CAPM and the Cross-Section of Expected Returns", Journal of Finance, 51(1): 3-53, and Nick Durack, Robert B Durand and Ross A Maller (2004), "A best choice among asset pricing models? The Conditional Capital Asset Pricing Model in Australia", Accounting and Finance, 44: 139-162. Jagannathan and Wang note that the Sharpe-Lintner CAPM explains only 1% of the cross sectional variation in average returns on 100 portfolios constructed from US stock market data. In a study estimating alternative asset pricing

7.10.2 Black's CAPM

In 1972, Fischer Black derived, within the mean-variance framework within which the Sharpe-Lintner CAPM was derived, a capital asset pricing model (Black's CAPM) without assuming the existence of a risk free asset, and without assuming unrestricted borrowing and lending.[8]

In Black's derivation, the return on a portfolio for which return is uncorrelated with the return on the market portfolio acts as the equivalent of the risk free rate of return. Black called this portfolio the zero-beta portfolio, and denoted its expected return $E(r_z)$.

When there is no risk free asset, and there is no riskless borrowing or lending, the expected return on any asset i, $E(r_i)$, is a linear function of β_i:

$$E(r_i) = E(r_z) + (E(r_m) - E(r_z)) \times \beta_i.$$

This is Black's CAPM. β_i is now the ratio of the covariance between the return on financial asset i with the return on the zero-beta portfolio to the variance of the return on the zero-beta portfolio.

Black also showed that when there is a risk free asset available, but investors are not able to take short positions in that asset, $r_f < E(r_z) < E(r_m)$. In these circumstances:

- when β is low, the expected return predicted by the Sharpe-Lintner CAPM is less than the expected return predicted by the Black's CAPM; and
- when β is high, the expected return predicted by the Sharpe-Lintner CAPM is greater than the expected return predicted by Black's CAPM.

This seemed to accord with the findings from work by Black, Jensen and Scholes using US share price data for the period 1926 to 1966. Black, Jensen and Scholes found that expected returns on portfolios of shares with low βs were consistently higher than the expected returns predicted by the Sharpe-Lintner CAPM, and expected returns on

models using Australian share price data, Durand, Durack and Maller report that the Sharpe-Lintner CAPM explained only 7.25% of return variation.

[8] Fischer Black (1972), "Capital Market Equilibrium with Restricted Borrowing", Journal of Business, 45(3): 444-455. See also M J Brennan (1970), "Capital Market Equilibrium with Divergent Borrowing and Lending Rates", Journal of Financial and Quantitative Analysis, 6(5): 1197-1205.

portfolios of shares with high βs were consistently lower than the expected returns predicted by the Sharpe-Lintner CAPM.[9]

Black was able to explain why the slope of the relationship between rate of return and beta was less than the slope implied by the Sharpe-Lintner CAPM by dropping one of the most contentious of the assumptions required for CAPM derivation, the assumption of unlimited borrowing and lending at the risk free rate of return. Black's explanation retained the simple linear relationship between expected rate of return and beta.

7.10.3 Intertemporal Capital Asset Pricing

Not only were the assumptions required for the Sharpe-Lintner CAPM being questioned by the early 1970s. There were also concerns about the mean-variance framework within which asset pricing theory was being developed. The assumption that an investor is able to rank all of the available portfolios in terms of the means and variances of their uncertain returns is valid only if further assumptions are made about the shape of the probability distribution of returns and about the mathematical form of the utility function used to rank uncertain prospects. These further assumptions about the shape of the returns distribution and about the form of the utility function were seen by many economists as being unnecessarily specific.[10]

Robert Merton summarised the position in 1973:

Although the model [the Sharpe-Lintner CAPM] has been the basis for more than one hundred academic papers and has had a significant impact on the non-academic financial community, it is still subject to theoretical and empirical criticism. Because the model assumes that investors choose their portfolios according to the Markowitz mean-variance criterion, it is subject to all the theoretical objections to this criterion, of which there are many.[11]

Merton sought to avoid the theoretical objections to the mean-variance framework within which the Sharpe-Lintner CAPM (and Black's CAPM) had been derived, by deriving a general form of the asset pricing relationship using the standard model of intertemporal choice from microeconomic theory. His use of intertemporal choice theory allowed

9 Fischer Black, Michael C Jensen and Myron Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests", in Michael C Jensen (ed.), *Studies in the Theory of Capital Markets*, New York: Praeger.

10 See K Borch (1969), "A Note on Uncertainty and Indifference Curves", Review of Economic Studies, 36(1): 1-4; M S Feldstein (1969), "Mean-Variance Analysis in the Theory of Liquidity Preference and Portfolio Selection", Review of Economic Studies, 36(1): 5-12; and Nils H Hakansson (1971), "Capital Growth and the Mean-Variance Approach to Portfolio Selection", Journal of Financial and Quantitative Analysis, 6: 517-557.

11 Robert Merton (1973). "An Intertemporal Capital Asset Pricing Model", Econometrica, 41(5): 867-887.

another of the strong assumptions required for derivation of the Sharpe-Lintner CAPM – the assumption of a single time period – to be dropped, and opened the way to explicit consideration of the role of time in asset pricing. Merton's approach is referred to as intertemporal capital asset pricing.

Although Merton used sophisticated continuous time methods to derive particular results, his approach can be presented in somewhat simpler discrete time form.[12]

In the discrete time version of intertemporal capital asset pricing, an individual, as an investor, chooses between current consumption of products and services, and consumption at a later time. In making this choice, the investor is constrained by the wealth which he or she currently has available. The investor can transfer wealth from the current period (today) to a later time (tomorrow) by purchasing financial assets today, and selling those assets tomorrow. This allows the investor to defer consumption today in the expectation of increased wealth, and hence increased consumption, tomorrow from the return on his or her investment in financial assets today.

The investor's preferences for consumption today (c_t) and consumption tomorrow (c_{t+1}) are represented by a utility function, $U(c_t, c_{t+1})$, which allows a consistent numerical ranking of those preferences.

Markets for financial assets are assumed to be competitive, and there are no taxes or transaction costs. The investor can buy or sell as much of a financial asset as she wishes at today's asset price (p_t). She knows p_t but does not know the payoff (x_{t+1}) from her investment tomorrow.[13] The payoff from an investment is, in general, not known with certainty, although the range of possible payoffs, and the probability distribution of payoffs over that range, is known. In consequence, the investor does not know her wealth tomorrow with certainty and, because she does not know her wealth, she does not know her consumption tomorrow with certainty.

The investor's assessment, made today, of her utility from consumption today and consumption tomorrow, can be represented as:

$$U(c_t, c_{t+1}) = u(c_t) + E_t[\delta u(c_{t+1})].$$

$u(c_t)$ is the utility from known consumption today. $E_t[u(c_{t+1})]$ is the expected utility (the expectation being formed on the basis of what is known today) of uncertain consumption

12 See, for example, John H. Cochrane, *Asset Pricing*, revised ed., Princeton: Princeton University Press; and Sumru Altug and Pamela Labadie (2008), *Asset Pricing for Dynamic Economies*, Cambridge: Cambridge University Press.

13 The investor's expected rate of return is $r_{t+1} = x_{t+1}/p_t - 1$. (Asset prices are the link between uncertain returns and expected rates of return. Hence the problem of explaining expected rates of return is the problem of explaining asset prices.)

tomorrow. δ is a parameter indicating the investor's impatience – her preference for consuming today, rather than postponing consumption until tomorrow. The period utility function u(c) is increasing (the investor always prefers more consumption), and concave (although more consumption is always preferred, additional consumption has declining marginal value).

Let k_t denote the investor's consumption today if she buys none of the financial asset today, and let k_{t+1} denote her consumption tomorrow if she buys none of the financial asset today. If, then, she buys n units of the asset today, her consumption today is:

$c_t = k_t – p_t n.$

On selling the n units of the asset tomorrow, her consumption tomorrow is:

$c_{t+1} = k_{t+1} + x_{t+1} n.$

How much of the financial asset should the investor buy today? The number of units of the asset she should buy is the number which maximises her utility $U(c_t, c_{t+1})$ subject to the constraints:

$c_t = k_t – p_t n$

and

$c_t = k_{t+1} + x_{t+1} n.$

The investor's utility is maximised when:

$p_t u'(c_t) = E_t[\delta u'(c_{t+1}) x_{t+1}].$

$p_t u'(c_t))$ is the reduction in utility from buying one more unit of the financial asset today, and reducing consumption today by an equivalent amount. $E_t[\delta u'(c_{t+1}) x_{t+1}]$ is the increase in expected discounted utility obtained from additional consumption tomorrow made possible by the payoff from investment in the asset tomorrow. To maximize her utility from consumption today and tomorrow, the investor must buy, today, that number of units of the financial asset for which the reduction in utility today is equal to the increase in expected discounted utility obtained from the additional consumption tomorrow made possible by the payoff from her investment.

When markets are in equilibrium, the price of the financial asset today is obtained from the condition for utility maximisation:

$p_t = E_t[\delta(u'(c_{t+1})/u'(c_t)) x_{t+1}] = E_t[m_{t+1} x_{t+1}],$

where $m_{t+1} = \delta u'(c_{t+1})/u'(c_t)$ is called the stochastic discount factor.

The stochastic discount factor, m_{t+1}, is the product of:

- investor "impatience" (δ) – a measure of preference for consuming today, rather than postponing consumption until tomorrow; and
- the ratio of the marginal utility from consumption tomorrow to the marginal utility of consumption today (u/(ct+1)/u/(ct)).

The stochastic discount factor reveals a fundamental determinant of asset prices and, hence, of rates of return: the rate at which investors are willing to substitute consumption tomorrow for consumption today. This rate is, in turn, determined by the rate of growth in consumption between today and tomorrow. Asset prices (and rates of return) are, therefore, determined by expectations about consumption growth. This important result links asset prices to the state of the economy.

Since the rate of return on an asset is $r_{t+1} = x_{t+1}/p_t - 1$, the asset pricing equation can be written in terms of rate of return:

$E_t[m_{t+1}(1 + r_{t+1})] = 1.$

Now, a risk free asset is an asset which has the same payoff in every uncertain state, and therefore has the same rate of return in each state. The rate of return on a risk free asset is:

$r_f = 1/E_t(m_{t+1}) - 1.$

Using this form of the risk free rate, the expected rate of return on any (risky) asset is:

$E_t(r_{t+1}) = r_f - (1 + r_f) \times \text{cov}(m_{t+1}, r_{t+1}).$

That is, the rate of return on any asset can be represented as the sum of:

- the risk free rate of return, r_f; and
- a risk premium, $-(1 + r_f) \times \text{cov}(m_{t+1}, r_{t+1})$.

The risk premium is determined by the covariance of asset return with the stochastic discount factor: assets for which the covariance of return with the discount factor is large in absolute value, but negative, have higher expected rates of return.

In intertemporal capital asset pricing, the variability of asset returns does not contribute to the risk premium. Only the covariance of asset return with investor expectations about consumption growth, as measured by the discount factor, is factored into expected returns via the risk premium.

For a number of reasons, relating the stochastic discount factor directly to consumption growth does not facilitate the development of asset pricing beyond the rather abstract presentation above.[14] In these circumstances, more specific representations of the discount factor have been sought. In one line of research, the discount factor is modelled as a linear function of the economic factors, f_i, which determine consumption growth. The asset pricing equation, $E_t[m_{t+1}(1+ r_{t+1})] = 1$, then has a "beta representation":

$$E_t(r) = a + b1 \times \beta_{f1,\, r} + b_2 \times \beta_{f2,\, r} + \ldots + b_n \times \beta_{fn,\, r},$$

where:

$E_t(r)$ is the expected rate of return;

a is a constant;

$b_i = \alpha \times var(f_i)$, α a constant; and

$\beta_{fi,\, r} = cov(f_i, r)/var(f_i)$

These linear factor models are an area of current theoretical and empirical research in financial economics. A key issue for this research is the question of what are the appropriate factors. Theoretical considerations, as outlined above, require that they be variables which can be explicitly related to investor marginal utility or consumption growth.

As noted above, expected returns are high when asset risk premia are large in absolute value but negative. This will be the case when asset returns covary positively with investor consumption of goods and services. If returns are high, consumption is high, the marginal utility of consumption is low, the covariance of the stochastic discount factor and asset return is negative, and the risk premium in asset return is positive.

The factors which should, then, be used in a linear factor model of the stochastic discount factor should be positively related to consumption.

One such factor is the return on a portfolio of total wealth. Consumption is high when investor returns on a portfolio of all assets is high. This portfolio of all assets would

[14] See Cochrane, 77.

comprise financial assets, real – tangible – assets, and intangible – but valuable – assets such as investments in human capital.

If the number of factors is restricted to one, and that one factor is the return on a portfolio of total wealth (r_w), the beta representation of the basic asset pricing equation is:

$E_t(r_{t+1}) = r_f + (E(r_w) – r_f) \times \beta_{w,r}$.

This is the (conditional) Sharpe-Lintner CAPM (the expected rate of return is conditional on the information available today). If further assumptions are made (for example, returns distributions are identically and independently multivariate normal), the conditioning can be removed, and the model reduces to the Sharpe-Lintner CAPM.

Restriction of the number of parameters to one – return on a portfolio of total wealth – is, however, arbitrary. Multiple linear factor models now dominate empirical asset pricing research, and one of the most widely recognised – and tested – of these is the Fama-French three-factor CAPM.15

7.10.4 Multiple linear factor models: Fama and French

Although early empirical work provided broad support for the Sharpe-Lintner CAPM, further work during the 1980s began to reveal "anomalies" – asset pricing behaviour which appeared to deviate from the predictions of the CAPM.[16] These anomalies included:

- a size effect: low market value shares have higher returns than can be explained by the Sharpe-Lintner CAPM;
- a value effect: returns are predicted by ratios of market value to accounting measures such as earnings and book value of equity; and
- a momentum effect: shares with high returns during the past three to 12 months tend to have higher returns in the immediate future.

Fama and French proposed that these anomalies were interrelated and captured by a three-factor model of asset prices. The three factors are:

- the excess return to the market portfolio, E(rm) – rf;
- the difference between the return to a portfolio of high book-to-market shares and the return to a portfolio of low book-to-market shares (HML); and

15 Cochrane, 438.

16 Campbell, 1526-1529.

- the difference between the return to a portfolio of small capitalization shares and a portfolio of large capitalization shares (SML).

The Fama-French three-factor CAPM is:

$E(r) = r_f + (E(r_m) – r_f) \times \beta_{rm} + HML \times h + SMB \times s.$

Tests using US stock market data have shown that the three factor model appears to have significantly greater explanatory power than the Sharpe-Lintner CAPM.[17] Similar results have also been obtained using Australian share prices.[18]

7.10.5 Use of a well accepted financial model

In the preceding paragraphs of this section of this submission, WAGN has presented four models of the economic processes through which expected rates of return on financial assets are generated. For the purpose of calculating an expected rate of return on equity to be used in determining the total revenue and revised reference tariffs for the WAGN GDS, choice among these models is guided by Rule 87(2). Rule 87(2) points to use of a well accepted financial model, such as the [Sharpe-Lintner] CAPM, in the calculation of the expected rate of return on equity.

Early empirical work provided broad support for the Sharpe-Lintner CAPM, but more recent theoretical and empirical work has led many financial economists to question its validity.

Black derived a capital asset pricing model without assuming the existence of a risk free asset, and without assuming unrestricted borrowing and lending. Black's CAPM, is able to accommodate a flatter trade-off of rate of return and beta than the Sharpe-Lintner CAPM, and has had some success.[19]

Merton sought to avoid many of the theoretical objections to the mean-variance framework within which the Sharpe-Lintner CAPM (and Black's CAPM) had been developed, by deriving a general form of the asset pricing relationship using the standard model of intertemporal choice model from microeconomic theory.

17 See, for example, Eugene F. Fama and Kenneth R. French (1996), "Multi-factor Explanations of Asset-Pricing Anomalies", Journal of Finance, 47: 426-465.

18 Clive Gaunt (2004), "Size and book to market effects and the Fama French three factor asset pricing model: evidence from the Australian stockmarket", Accounting and Finance, 44: 27-44.

19 Eugene F. Fama and Kenneth R. French (2004), "The Capital Asset Pricing Model: Theory and Evidence", Journal of Economic Perspectives, 18(3): 25-46.

Intertemporal capital asset pricing provides a clear understanding of the limitations of the Sharpe-Lintner CAPM, and of the theoretical (mean-variance) framework within which it was derived.

Derivation of the Sharpe-Lintner CAPM within the framework of intertemporal capital asset pricing emphasizes the fact that the relevant measure of wealth is not the market value of a portfolio of financial assets. It is the value of all assets held by the investor including financial assets, real assets, and intangible assets. However, the return on total wealth cannot be measured, and this may make the validity of Sharpe-Lintner CAPM untestable. This is the essence of Roll's critique.[20]

The sensitivity of tests of the Sharpe-Lintner CAPM to the types of assets included in the market portfolio has been assessed using a number of broader proxies for the market portfolio.[21] Stambaugh has shown that similar inferences could be made for portfolios comprising shares, bonds, and shares, bonds and real estate. His work suggests that inferences are not sensitive to the composition of the asset portfolio, and that Roll's critique may not be an empirical problem.

Derivation of the Sharpe-Lintner CAPM within the framework of intertemporal capital asset pricing also shows that the parameters of the relationship are time-dependent. They vary with changes in the information available to investors, and make the model untestable without significant auxiliary restrictions being placed on the statistical properties of the underlying economic processes generating returns.[22] Cochrane refers to this as the "Hansen-Richard critique" by analogy with Roll's "critique", and notes:

. . . even if the wealth portfolio were observable, the fact that we cannot observe agents' information sets dooms tests of the [Sharpe-Lintner] CAPM.

[20] Richard Roll (1977), "A Critique of the Asset Pricing Theory's Tests – Part I: On Past and Potential Testability of the Theory", Journal of Financial Economics, 4: 129-176.

[21] See Jay Shanken (1987), "Multivariate Proxies and Asset Pricing Relations: Living with the Roll Critique", Journal of Financial Economics, 18: 91-110; and Robert F Stambaugh (1982), "On the Exclusion of Assets from Tests of the Two Parameter Model", Journal of Financial Economics, 10: 235-268.

[22] See Cochrane, 143. WAGN has not considered further the possibility that the Sharpe-Lintner CAPM may hold conditionally, but not unconditionally. If the Sharpe-Lintner CAPM holds conditionally, difficult questions arise as to how a time varying beta is to estimated and incorporated into a rate of return to be applied in the total revenue calculation required by the NGR. A review of earlier research which purports to show that the Sharpe-Lintner CAPM holds conditionally, and new theory and evidence which shows that the conditional CAPM performs nearly as poorly as the unconditional CAPM, are provided in Jonathan Lewellen and Stefan Nagel (2006), "The conditional CAPM does not explain asset-pricing anomalies", Journal of Financial Economics, 82: 289-314.

Intertemporal capital asset pricing also opened up new insights into asset pricing, "connecting" asset prices with macroeconomic risks through the risk premia established in asset markets.

Although intertemporal capital asset pricing indicates the appropriateness of a multiple factor model such as that proposed by Fama and French, it does not provide specific guidance on the choice of factors. This has led some financial economists to argue that the fact that the three factor model provides a better "fit" than the Sharpe-Lintner CAPM is not indicative of superior explanatory power, but a fortuitous outcome from judicious choice of the relevant "explanatory" variables.[23]

Others concur with Fama and French that the three factors are proxies for specific macro-economic risks. Liew and Vassalou, for example, find a positive relationship between the factor HML and future growth in the economy, and between SMB and future growth.[24] They conclude that their work supports the contention of Fama and French that these variables act as state variables in the context of intertemporal capital asset pricing. Further support for this view is provided by Vassalou.[25]

Although the theoretical basis of the Fama-French three factor model remains in doubt, Da, Guo and Jagannathan noted, early in 2009, that "the model has received wide attention and has become the standard model for computing risk adjusted returns in the empirical financing literature".[26]

Since 2000, financial economists have advanced a large number of asset pricing models examining a wider range of factors within the multiple factors framework.

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23 See, for example, A Craig MacKinlay (1995), "Multifactor models do not explain deviations from the CAPM", Journal of Financial Economics, 38: 3-28.

24 Jimmy Liew and Maria Vassalou (2000), "Can book-to-market, size and momentum be risk factors that predict economic growth?", Journal of Financial Economics, 57: 221-245.

25 Maria Vassalou (2003), "News related to future GDP growth as a risk factor in equity returns", Journal of Financial Economics, 68: 47-73.

26 Zhi Da, Re-Jin Guo and Ravi Jagannathan (2009), "CAPM for Estimating the Cost of Equity Capital: Interpreting the Empirical Evidence", National Bureau of Economic Research Working Paper 14889. Other results reported in this working paper have been cited by the AER as supporting continued use of the Sharpe-Lintner CAPM. Those results were, however, obtained using "aged betas" – betas from 2 to 10 years earlier, the "aging" being intended to account for slow investor adjustment to recent changes in market risk. In the absence of strong justification, this use of aged betas has the appearance of the judicious choice of explanatory variables – the questionable "data snooping" – which has led some financial economists to reject the Fama-French three factor model. The working paper on which Da, Guo and Jagannathan rely for support of their aged betas approach appears to have been withdrawn by its authors, drawing into question the conclusion that the Sharpe-Lintner CAPM continues to provide a reasonable estimate of expected rate of return, at least for individual projects.

Labour income is about two-thirds of US GDP, and capital income is only about one third: human capital is therefore an important component of total wealth.[27] This prompted Jagannathan and Wang to argue that labour income growth was a good proxy for return on human capital, and to show that its inclusion as a factor improves the "fit" of the conditional Sharpe-Lintner CAPM to the data.[28] Following Jagannathan and Wang, Heaton and Lucas, Jacobs and Wang, Santos and Veronesi, and Durack, Durand and Maller also examined labour income as a risk factor helping to explain rates of return.[29]

Durack, Durand and Maller replicated the work of Jagannathan and Wang using Australia share price data. They found that extending the market portfolio to include a measure of the return to human capital did little to improve the explanatory power of the Sharpe-Lintner CAPM. Furthermore, they found that the size and book-to-market variables of the Fama-French model three factor model were highly significant in tests using cross section data. Size and book-to-market did not appear to be, as Jagannathan and Wang had argued, simply proxies for risks associated with beta variation over time.

Aggregate liquidity has also been identified as a factor explaining asset prices. An investor who borrows to finance a portfolio, and who faces a margin or solvency constraint must sell assets to raise cash when her total wealth drops sufficiently. If she holds assets with returns which are sensitive to changes in liquidity, then such liquidations are more likely to occur when liquidity is low, since reductions in total wealth are more likely to occur with reductions in liquidity. Liquidation is more costly when liquidity is low, and those additional costs are a further imposition on an investor whose wealth has already fallen and who, in consequence, has a higher marginal utility of consumption. Unless the investor can expect a higher rate of return from holding the financial assets in question, she will prefer assets less likely to require liquidation when aggregate liquidity is low.[30]

27 Campbell, 1527.

28 Ravi Jagannathan and Z Wang (1996), "The Conditional CAPM and the Cross-Section of Expected Returns", Journal of Finance, 51(1): 3-53.

29 J C Heaton and D J Lucas (2000), "Asset pricing and portfolio choice: the role of entrepreneurial risk", Journal of Finance, 55: 1163-1198; Nick Durack, Robert B Durand and Ross A Maller (2004), "A best choice among asset pricing models? The Conditional Capital Asset Pricing Model in Australia", Accounting and Finance, 44(2): 139-162; K Jacobs and Z Wang (2004), "Idiosyncratic consumption risk and the cross section of asset returns, Journal of Finance, 59: 2211-2252; T Santos and P Veronesi (2006), "Labour income and predictable stock returns", Review of Financial Studies, 19: 1-44.

30 See, for example, Lubos Pastor and Robert F Stambaugh (2003), "Liquidity Risk and Expected Stock Returns", Journal of Political Economy, 111(3): 642-685; and Viral V Acharya and Lasse H Pedersen (2005), "Asset pricing with liquidity risk", Journal of Financial Economics, 77: 375-410.

From this brief review of asset pricing research since the 1960s, WAGN has concluded that intertemporal capital asset pricing is a well accepted financial model.[31] However, it does not, currently lead to a single specific relationship which may be used to estimate expected rates of return on financial assets: there is, at present, no single model which explains the economic processes which generate asset prices.

The Sharpe-Lintner CAPM, Black's CAPM and the Fama-French three factor model are three specific forms of the multiple linear factor model derived from intertemporal capital asset pricing. Each of these three forms provides an important insight into the way in which asset prices are determined. However, each also has recognized weaknesses, and each is no more than a partial representation focusing on particular determinants of asset prices. Nevertheless, intertemporal capital asset pricing continues to be used in by financial economists studying asset pricing. Furthermore, each of the three specific forms of the multiple linear factor model described above is well accepted by financial economists, not necessarily because it correctly prices financial assets, but because it provides an important insight into the economic processes which generate expected rates of return.

In concluding that intertemporal capital asset pricing is well accepted, WAGN has, in effect, assumed that those most competent to decide the issue are financial economists working in the field of asset pricing. This group has the expertise necessary to make informed judgements about methods and models which are used in asset pricing, and about the techniques of statistical inference which must be applied in testing those models.

WAGN is aware that others have reached a different answer to the question "By whom is the model well accepted?" when considering whether a financial model of the type required by Rule 87(2) is well accepted.

Some have argued that Sharpe-Lintner CAPM is well accepted because an examination of financial market practice indicates that, in Australia at least, that model is widely used by financial market practitioners.

[31] In providing this brief review, WAGN has not considered recent research examining arbitrage pricing theory, dynamic asset pricing models, and asset pricing in conditions information symmetry. Nor has it given much consideration to the investigation of asset pricing in the context of growing economies in which investment is taking place. Furthermore, WAGN has not examined the research on asset pricing by the growing body of financial economists who adopt a behavioural perspective, rather than the perspective of rational utility maximisation. WAGN has not considered the insights into asset pricing provided by this recent research, not because it is unimportant, but because it has not yet provided models which are well accepted among the financial economists whose expertise is asset pricing. However, this recent research is a clear indicator that earlier models, do not provide a complete description of the economic processes which generate asset prices.

In a survey conducted by Truong, Partington and Peat in 2004, some 72% of the 53 respondent Australian companies indicated that they used the Sharpe-Lintner CAPM in estimating the cost of capital.[32] Only one respondent indicated use of a multiple factor model, and no respondent was using the Fama-French three factor model.

The degree of rigour adopted by these users of the Sharpe-Lintner CAPM in their estimation of the parameters of the model, and in the way in which they actually applied the results, was not clear from the survey. Truong, Partington and Peat noted that the majority of respondents claimed to use varying values for the risk free rate, the market risk premium and the equity beta.[33]

This apparent widespread use of the Sharpe-Lintner CAPM might be expected: the Sharpe-Lintner CAPM continues to be used to provide an introduction to asset pricing theory in the teaching of, and in textbooks on, corporate finance. As Fama and French have observed:

We continue to teach the [Sharpe-Lintner] CAPM as an introduction to the fundamental concepts of portfolio theory and asset pricing, to be built on by more complicated models like Merton's (1973) ICAPM.[34]

Pedagogical use does not qualify the Sharpe-Lintner CAPM as a well accepted financial model, and the practitioners who claim to use it also reject it.

This apparent contradiction – rejection of the Sharpe-Lintner CAPM by those who claim to use it – is clear from the submission made by the Financial Investor Group (FIG) to the AER's WACC parameter review.[35] Section 4.5 of that submission noted:

In assessing the AER's approach to applying the CAPM, the FIG observes that the CAPM – despite its limitations – is widely used by stockbroker analysts and other sectors of the market.

However, the submission continues:

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32 Giang Truong, Graham Partington, and Maurice Peat (2008), "Cost-of-Capital Estimation and Capital Budgeting Practice in Australia", Australian Journal of Management, 33(1): 95-121.

33 Truong, Partington and Peat, 109.

34 Eugene F. Fama and Kenneth R. French (2004). "The Capital Asset Pricing Model: Theory and Evidence", Journal of Economic Perspectives, 18(3): 25-46.

35 Financial Investor Group (AMP Capital Investors/Macquarie, APA Group, Babcock and Brown Infrastructure, Cheung Kong Infrastructure Holdings Limited, Hasting Funds Management, Hong Kong Electric Holdings Limited, Singapore Power and Spark Infrastructure), *Submission to the AER's WACC Parameter Review: The investor perspective*, January 2009.

Market practitioners often use their commercial judgement in applying the CAPM to ensure the outcomes accord with market reality.

Practitioners, it seems, start with the Sharpe-Lintner CAPM, but they adjust the results it produces. There is no indication in the FIG submission of how market practitioners establish "market reality". The adjustments which they make must, then, be regarded as arbitrary. They indicate that the Sharpe-Lintner CAPM is, in fact, not well accepted among practitioners. The use of "commercial judgement" allows financial market practitioners to be guided by the Sharpe-Lintner CAPM without their having to rely on the results it produces.

In the setting of regulated access prices, Australian regulators have not been inclined to make "commercial judgements" in establishing rates of return. Nor have they accepted the "commercial judgements" of the service providers which they regulate.

7.10.6 Estimating the expected return on equity

Having concluded that intertemporal capital asset pricing is a well accepted financial model, WAGN retained economics consultants NERA to estimate the parameters of the Sharpe-Lintner CAPM, Black's CAPM, the Fama-French three factor model, and a fourth variant of the multiple linear factor model derived from intertemporal capital asset pricing, a zero-beta version of the Fama-French model. The zero-beta version of the Fama-French model, like Black's CAPM, gives recognition to the fact that investors are not able to borrow and lend freely at the risk free rate of return.

The results from NERA's work are summarized in Table 65. **[Deleted – Confidential]**

Table 65 Return on equity parameter estimates

CAPM	Zero-beta premium*	Betas		
		Market	HML	SMB
Sharpe-Lintner		0.52		
Black (zero beta) model	0.08	0.52		
Fama-French three-factor model		0.65	0.38	0.44
Fama-French (zero beta) three factor model	0.08	0.65	0.38	0.44

* WAGN's estimate

NERA estimated the parameters of each of these models using data and econometric methods similar to those which were used by Associate Professor Henry to estimate the parameters of the Sharpe-Lintner CAPM for the AER.

WAGN notes that NERA's estimate of beta for the Sharpe-Lintner CAPM, 0.52, is close to the midpoint of the range 0.4 to 0.7 reported by the AER. The AER has, however, ascertained that prevailing conditions in the market for funds support a higher value – 0.80 – for beta.

These parameter estimates have been used to make the estimates of the expected rate of return on equity shown in Table 66.

The estimate made using the Sharpe-Lintner CAPM uses the AER's estimate of 0.80 for beta.

Table 66 Estimated rates of return on equity

CAPM	Calculation
Sharpe-Lintner	$E(r_e) = r_f + (E(r_m) - r_f) \times \beta$ r_f = 5.59% β = 0.80 $E(r_m - r_f)$ = 8.00% $E(r_e)$ = 5.59% + 8.00% x 0.80 = **11.99%**
Black (zero beta)	$E(r_e) = r_f + z + (E(r_m) - r_f - z) \times \beta$ r_f = 5.59% z = 8.00% β = 0.52 $E(r_m - r_f)$ = 8.00% $E(r_e)$ = 5.59% + 8.00% + (8.00% - 8.00%) x 0.52 = **13.59%**
Fama-French three factor	$E(r_e) = r_f + (E(r_m) - r_f) \times b + HML \times h + SMB \times s$ r_f = 5.59% b = 0.65 $E(r_m - r_f)$ = 8.00% h = 0.38 s = 0.44 HML = 3.61% SMB = 2.58% $E(r_e)$ = 5.59% + 8.00% x 0.65 + 3.61% x 0.38+ 2.58% x 0.44 = **13.30%**
Fama-French (zero beta) three factor	$E(r_e) = r_f + z + (E(r_m) - r_f - z) \times b + HML \times h + SMB \times s$ r_f = 5.59% z = 8.00% b = 0.65 $E(r_m - r_f)$ = 8.00% h = 0.38 s = 0.44 HML = 3.61% SMB = 2.58% $E(r_e)$ = 5.59% + 8.00% + (8.00% - 8.00%) x 0.65 + 3.61% x 0.38 + 2.58% x 0.44 = **16.10%**

7.11 Applying Rule 87(2): expected inflation

WAGN has used a method proposed by the AER to estimate the rate inflation to be used in the calculation of a real (pre-tax) WACC.[36] Expected inflation has been calculated as the geometric mean of Reserve Bank of Australia inflation forecasts (forecast changes in the Consumer Price Index) for the next 10 years. These forecasts are:

- 2.50% for the year to June 2010;
- 2.25% for the year to December 2010;
- 2.25% for the year to June 2011; and
- 2.50% for each year from July 2011.

The forecasts for the year to June 2010, the year to December 2010, and the year to June 2011, are from the Reserve Bank's November 2009 *Statement on Monetary Policy*. The forecast for each year from July 2011, 2.50%, is the midpoint of the Reserve Bank target range for inflation.

The geometric mean of these forecasts – WAGN's estimate of expected inflation – is 2.47%.

7.12 Applying Rule 87(2): weighted average cost of capital

To guide its setting of the rate of return WAGN has, in accordance with the requirements of Rule 87(2), calculated a real pre-tax WACC which incorporates the costs of equity and debt. WAGN has, in fact, made four such calculations, one for each of the estimates of the expected nominal post-tax return on equity set out in Table 66 above.

These calculations have been made using the parameter values established in sections 7.4 to 7.11 of this submission. The key parameter values (excluding those for the expected rate of return on equity calculation, which are set out in Table 66) are summarised in Table 67.

[36] Australian Energy Regulator, *Draft Decision – public version: ActewAGL Access arrangement proposal for the ACT, Queanbeyan and Palerang gas distribution network 1 July 2010 – 30 June 2015*, November 2009; and *Draft Decision – public version: Country Energy Wagga Wagga Natural Gas Distribution Network Access Arrangement proposal*, November 2009. See also, Economic Regulation Authority, *Draft Decision on GGT's Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline – Redacted version*, 9 October 2009.

Table 67 Weighted average cost of capital parameters (beta = 0.80)

Parameter	Value
Gearing (ratio of debt to total financing	60.0%
Tax rate	30.0%
Nominal risk free rate of return	5.59%
Market risk premium	8.0%
Gamma (value of imputation credits)	0.2
Debt risk premium	4.5%
Allowance for debt raising costs	0.288%
Expected inflation	2.47%

The WACC's which WAGN has calculated are summarized in Table 68. (Where the cost of equity has been determined using the Sharpe-Lintner CAPM, beta has been set at 0.80.)

Table 68 Pre-tax weighted average cost of capital

Method of determining cost of equity	Nominal WACC	Real WACC
Sharpe-Lintner CAPM	12.54%	9.82%
Black (zero beta) CAPM	13.38%	10.64%
Fama-French three factor CAPM	13.23%	10.49%
Fama-French (zero beta) three factor CAPM	14.70%	11.93%

7.13 Determining the rate of return: applying Rule 87(1)

The different forms of the multiple linear factor model derived from intertemporal capital asset pricing give different values for the expected return on equity and, in consequence, different values for a WACC calculated in accordance with the requirements of Rule 87(2). These different values for the WACC reflect different views on the factors which are important in determining expected rates of return on financial assets.

In determining a rate of return using the results of the calculations required by Rule 87(2), the criterion of Rule 87(1) is to be applied. Rule 87(1) requires a rate of return which is commensurate with prevailing conditions in the market for funds and the risks involved in providing the reference service.

Through the appropriate choice of the parameters used in the calculation of a WACC in accordance with Rule 87(2), determination of the rate of return will take into account some aspects of prevailing conditions in the market for funds. It will not take into account

all aspects of prevailing conditions, in part because the way in which the rate of return on equity is estimated takes into account only certain aspects of the economic processes through which returns on financial assets are determined. No single asset pricing model can, on its own, provide an estimate of expected rate of return on equity which is commensurate with prevailing conditions in the market for funds.

Furthermore, determination of a rate of return using a WACC calculated in accordance with Rule 87(2) cannot fully take into account the risks involved in providing reference services using a covered pipeline system. Nor, if such a rate of return were used in determining a reference tariff, would it allow for a rate of return commensurate with the regulatory and commercial risks involved in providing the reference service to which the tariff relates. This is because there is no well accepted financial model which can be used to estimate an expected rate of return on equity which properly takes into account all technical and regulatory risks.

One reason for this is the narrow view of risk in each of the models for estimation of the rate of return on equity which WAGN has considered (Sharpe-Lintner CAPM, Black's CAPM, intertemporal capital asset pricing). In these models, the only risk which matters for asset pricing is investor consumption risk as measured by the covariance of asset return with investor expectations about consumption growth. (In the case of the Sharpe-Lintner CAPM, investor expectations about consumption growth are seen as being correlated with variation in the return on a portfolio of total wealth, and risk is then the contribution of a specific asset to the riskiness of the market portfolio.) Irrespective of whether the approach to risk is through the mean-variance framework within which the Sharpe-Lintner CAPM and the Black CAPM are derived, or whether it is the framework of intertemporal asset pricing which leads to the Fama-French models, the underlying theoretical scheme is limited to investors buying and selling financial assets. This scheme is that of a simple exchange economy. It does not incorporate production, the regulation of productive activity, or technological change and economic growth. Pricing models derived by assuming a simple exchange economy cannot provide a complete explanation of the determinants of asset prices. They do not take into account the technological, market and regulatory risks to which the owners of physical assets are exposed.

In consequence, some have argued that the technological, market and regulatory risks to which the owners of physical assets are exposed are not relevant to the rates of return on the financial assets which finance those physical assets. This is not the case. Those risks are seen as not being relevant because they are excluded by the choice of the premises from which many asset pricing models (including the Sharpe-Lintner CAPM, the Black CAPM and the models developed within the intertemporal capital asset pricing framework) are derived. These models are derived from premises which reduce the economy to exchanges of financial assets intended to maximise investor utility from consumption subject to an initial distribution of investor wealth. Technological, market

and regulatory risks are, then, irrelevant not because they are unimportant but because the premises chosen for model derivation exclude technological change, investments in physical assets, and competition and regulation in the markets in which those assets are operated.

As Cochrane has argued, the macroeconomic shocks – the sources of risk which asset pricing models seek to price – are seen not only in aggregate consumption data, but also in production, investment and employment data. The focus on the consumption decision which is at the core of intertemporal capital asset pricing is a "weak link".[37] Asset pricing should also be linked to production through explicit modelling of the behaviour of firms within a general equilibrium framework broader than that in which intertemporal capital asset pricing has been developed. This is not new.[38] The derivation and testing of asset pricing models which incorporate production, investment and economic growth is an active area of research.[39] However, it has not yet led to widely accepted models of asset pricing.

Intertemporal capital asset pricing (which includes the Sharpe-Lintner CAPM as a special case) provides, then, an incomplete explanation of the economic processes which generate asset prices. In these circumstances, one way of interpreting the Fama-French factors (which do not, at present, have clear theoretical interpretation) is that they proxy for missing still-to-be-identified factors which positively correlate with aggregate consumption. Whether the Fama-French factors may also be acting as proxies for elements of the economic processes generating asset prices which are missing from intertemporal capital asset pricing is unclear. There is no a priori reason for expecting that the Fama-French factors capture "the risks involved in providing the reference services".

In view of these broader considerations about asset pricing and risk, and about intertemporal capital asset pricing in particular, determination of a rate of return for the WAGN GDS should recognise that:

- there are multiple models which might be used in calculating an expected rate of return on equity;

37 John H Cochrane (2007), "Financial Markets and the Real Economy", in Rajnish Mehra (ed.), *Handbook of the Equity Risk Premium*, New York: Elsevier.

38 An early study of this type which examines the impact of one aspect of government – taxation – on asset pricing within a production context is William A Brock (1982), "Asset Prices in a Production Economy", in John J McCall (ed.), *Economics of Information and Uncertainty*, Chicago: Chicago University Press.

39 See Sumru Altug and Pamela Labadie (2008), *Asset Pricing for Dynamic Economies*, Cambridge: Cambridge University Press. John H Cochrane (1996), "A Cross-Sectional Test of an Investment-Based Asset Pricing Model", Journal of Political Economy 104(3): 572-621, is an important partial analysis and empirical investigation, and Cochrane (2007) provides a brief review of the literature.

- these models – the multiple linear factor models described above – are all particular cases of intertemporal capital asset pricing which is a well-accepted financial model;
- each of these models provides an important insight into the way in which asset prices are determined, but each also has specific limitations; and
- intertemporal capital asset pricing (which includes the Sharpe-Lintner CAPM as a special case) does not – and cannot – provide an estimate of expected rate of return on equity which is commensurate with prevailing conditions in the market for funds and with the risks involved in delivering the reference services because it is derived from a view of the economic processes generating expected returns which is incomplete.

There is, in these circumstances, uncertainty about the form of the model of the economic processes which generate expected rates of return on equity, and uncertainty about the extent to which any specific model can indicate a rate of return which is commensurate with prevailing conditions in the market for funds and with the risks involved in delivering the reference services provided using the WAGN GDS.

This uncertainty may be, at least partially, resolved by determining that a rate of return which is commensurate with prevailing conditions in the market for funds and the risks involved in providing the reference services is a higher, rather than a lower value. It is a rate of return in the upper quartile of the values for a real pre-tax WACC shown in Table 68. The lower limit of the upper quartile of the values for pre-tax real WACC shown in Table 68 is 11.4%.[40]

WAGN's resolution of the uncertainties about the form of the model of the economic processes which generate expected rates of return on equity, and about the extent to which any specific model can indicate a rate of return which is commensurate with prevailing conditions in the market for funds and with the risks involved in delivering the reference services, is different from the approach taken by the AER in its May 2009 Final Decision on WACC parameters for the electricity industry, and in its subsequent revenue and pricing decisions for electricity network and gas pipeline service providers. The AER has used the Sharpe-Lintner CAPM, but has adjusted the results to better reflect current market and other conditions by adjusting the value of beta. As noted in section 7.3 above, the econometrician retained by the national regulator found that the statistical evidence pointed to an estimate of beta lying in the range 0.4 to 0.7. In consequence, the AER argued that "market data suggests a value lower than 0.8", and "there is persuasive

[40] Calculated simply as the descriptive statistic Q_{75} = 9.82% + 0.75 x (11.93% - 9.92%) = 11.4%.

evidence to depart from either the previously adopted equity beta of 1.00 or 0.90".[41] Furthermore:

. . . the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the importance of regulatory stability. Having taken a broad view, the AER considers the value of 0.8 is appropriate.

. . .

In accordance with the NER, the AER considers that an equity beta of 0.80:

- *is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of adopting a lower equity beta*
- *is an appropriate estimate of a forward looking rate commensurate with prevailing conditions in the market for funds for a benchmark efficient NSP, and*
- is likely to promote efficient investment in providing prescribed transmission services or standard control services in current market conditions.[42]

In the case of the WAGN GDS, application of the AER's approach results in an expected rate of return on equity of 12.54%, and a rate of return (determined as a real pre-tax weighted average cost of capital) of 9.82% (see Table 68).

However, when WAGN's approach to determining the rate of return is available as an alternative, the AER's approach does not yield an estimate which, in accordance with the requirements of Rule 74:

- is an estimate arrived at on a reasonable basis; and
- represents the best estimate possible in the circumstances.

The AER's approach relies on:

- a single model for calculation of the expected rate of return on equity – the Sharpe-Lintner CAPM – which the AER recognises has limitations; and
- an essentially arbitrary value for beta.

The national regulator does not give detailed consideration to the limitations of the Sharpe-Lintner CAPM, and to their implications. (Certainly, in the case of its decisions

41 Australian Energy Regulator, May 2009 Final Decision, 343.

42 Australian Energy Regulator, May 2009 Final Decision, 343.

made in accordance with the *National Electricity Rules* the AER does not need to do so: those rules prescribe use of the Sharpe-Lintner CAPM.)

Nor does the AER provide much support for its required value of beta. The statistical evidence indicates a value in the range 0.4 to 0.7. However, the regulator seems to be of the view that prevailing conditions in the market for funds support a higher value of 0.8. If 0.8, why not 0.9 or 1.0, or even a higher value? It is the statistical evidence which leads the AER to the conclusion that there is persuasive evidence of a lower value for beta.

But in choosing 0.8, the regulator disregards the statistical evidence, and relies on its own "broad view" that other factors, which seem to include regulatory stability and prevailing conditions in the market for funds, are important in for determination of the expected rate of return on equity. However, regulatory stability is neither a requirement of Rule 87, nor is it one of the revenue and pricing principles which, in accordance with section 28(2) of the NGL, the regulator must take into account in approving those parts of an access arrangement relating to reference tariffs. Furthermore, no support is provided for a link between prevailing market conditions and the rate of return on equity, via the beta of the Sharpe-Lintner CAPM. In these circumstances:

- the argument that there is persuasive evidence supporting a lower equity beta – an argument which relies on the statistical evidence – is no longer valid; and
- the AER's decision to set beta at 0.8 is essentially arbitrary.

Through the choice of a specific model – the Sharpe-Lintner CAPM – which has clear limitations, and through the arbitrary way in which beta has been set, the AER's approach cannot provide an estimate – a rate of return – which has been arrived at on a reasonable basis.

A better estimate is obtained by explicitly recognising, as WAGN has done, uncertainty about the form of the model of the economic processes which generate expected rates of return on equity, and uncertainty about the extent to which any specific model can indicate a rate of return which is commensurate with prevailing conditions in the market for funds and with the risks involved in delivering reference services. By using multiple models, properly estimated using current financial market data, to take account of more of the available information on the economic processes which generate expected rates of return, WAGN's approach to determination of the rate of return for the WAGN GDS provides the best estimate possible in the circumstances.

When uncertainty is taken into account through the use of multiple models, it is not appropriate to account for that uncertainty twice through adjustment of the beta used in applying the Sharpe-Lintner CAPM. In these circumstances, in WAGN's approach to determination of the rate of return, the estimate of the expected rate of return on equity

made using the Sharpe-Lintner CAPM should be made using a statistically estimated beta such as NERA's estimate for WAGN of 0.52, or 0.55, the midpoint of the range established by Associate Professor Henry for the AER.

When beta is set at 0.52, the estimate of the expected rate of return on equity made using the Sharpe-Lintner CAPM is 9.75%, and the estimate of real pre-tax WACC made using this rate of return on equity is 8.67%. The pre-tax WACC" which WAGN has calculated are, then, those shown in Table 69 (which is Table 68 with the entries for the Sharpe-Lintner CAPM replaced by 11.36% (nominal) and 8.67% (real).

Table 69 Pre-tax weighted average cost of capital

Method of determining cost of equity	Nominal WACC	Real WACC
Sharpe-Lintner CAPM	11.36%	8.67%
Black (zero beta) CAPM	13.38%	10.64%
Fama-French three factor CAPM	13.23%	10.49%
Fama-French (zero beta) three factor CAPM	14.70%	11.93%

The lower limit of the upper quartile of the range of pre-tax real WACC's shown in Table 69 is 11.1%. WAGN has, therefore, determined the rate of return for the WAGN GDS to be 11.1% (real, pre-tax).

In applying Rule 87(1), consideration must be given to the regulatory scheme of the NGR which gives the regulator full discretion in approving the rate of return determined in accordance with Rule 87, subject to the requirements of Rule 74. When exercising that discretion in approving or making those parts of an access arrangement relating to a reference tariff, the regulator must have regard to the principles of section 24 of the NGL.

The relevant principles are:

- a reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates;
- regard should be had to the economic costs and risks of the potential for under and over investment by a service provider in a pipeline with which the service provider provides pipeline services; and
- regard should be had to the economic costs and risks of the potential for under and over utilisation of a pipeline with which a service provider provides pipeline services.

WAGN has set the rate of return for determination of the total revenue and revised reference tariffs for the WAGN GDS in a way which should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference services.

WAGN has set the rate of return for determination of the total revenue and revised reference tariffs for the WAGN GDS at a time of considerable uncertainty in financial markets. That uncertainty may now be reducing as government fiscal stimulus, in Australia and internationally, begins to have effect, as investment takes place, and as economic growth resumes. However, as the Reserve Bank of Australia has noted in its November 2009 *Statement on Monetary Policy*:

Significant risks, nevertheless, remain. Activity has recently been boosted by temporary fiscal measures and a slowing in the pace of inventory run-down, with the durability of the pick-up in growth remaining uncertain. Banking systems in a number of countries are still some way from full health and further bad news in the financial sector cannot be ruled out.

In these circumstances, the revised reference tariffs for the WAGN GDS, and the rate of return assumed for their determination, are in WAGN's view, conducive to further investment in the pipeline system. Currently, the relative economic costs of under-investment are high. Investment in the distribution system will be a contributor to needed economic stimulus, and will provide required infrastructure as growth resumes.

Furthermore, reference tariffs for the WAGN GDS determined using a real pre-tax rate of return of 11.1% will be higher than would be the case if a lower rate of return had been used. Higher tariffs are not expected to introduce significant economic costs and risks associated with over utilisation of the WAGN GDS. Nor are the reference tariffs so high that they might be expected to introduce significant economic costs and risks of underutilisation.

A real pre-tax rate of return of 11.1% should deliver a nominal post-tax rate of return on equity of around 14.5%. That rate of return on equity is consistent with the range 10% to 15% which investors have historically obtained from existing equity investment in regulated utility assets. However, it is lower than the 15% to 18% which investors see as now being required for new equity.[43]

[43] Financial Investor Group, *Supplementary submission to the ERA regarding its Draft Decision on Western Power's Proposed Revisions to the Access Arrangement for the South West Interconnected Network*, 22 October 2009.

8 TOTAL REVENUE

Reference tariffs determined by applying the sequence of four steps set out in section 9.4 of this submission should allow WAGN to recover that part of the total revenue allocated to reference services.

In accordance with Rule 76, the total revenue is to be determined using the "building block approach":

Total revenue is to be determined for each regulatory year of the access arrangement period using the building block approach in which the building blocks are:

(a) a return on the projected capital base for the year (See Divisions 4 and 5); and

(b) depreciation on the projected capital base for the year (See Division 6); and

(c) if applicable – the estimated cost of corporate income tax for the year; and

(d) increments or decrements for the year resulting from the operation of an incentive mechanism to encourage gains in efficiency (See Division 9); and

(e) a forecast of operating expenditure for the year (See Division 7).

The building blocks of total revenue in each regulatory year of the third access arrangement period, and the total revenue in each year, are shown in Table 70.

Table 70 Total revenue ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
Return on capital base	44.035	91.949	94.165	96.670	99.065
Return on working capital	0.427	1.605	1.988	2.223	2.462
Depreciation	0.328	24.349	26.299	28.203	30.123
Efficiency gains	2.179	2.248	0.969	2.211	1.311
Forecast operating expenditure	36.418	59.621	59.200	60.182	60.727
Total	**83.387**	**179.772**	**182.621**	**189.489**	**193.689**

No explicit estimate of tax has been made for the purpose of determining total revenue. Through use of a pre-tax WACC in the calculation of the return component of the Total Revenue, allowance is made – implicitly – for the cost of corporate income tax.

Under Australian taxation law, at least some of the shareholders of a corporation which distributes dividends receive credits for tax already paid at the corporate level. These

credits – imputation credits – effectively reduce the cost of tax to the ultimate owners of the corporation. Through the factor γ in the formula for the nominal post-tax WACC, the implicit allowance for the cost of corporate income tax is reduced to recognise the value of imputation credits to shareholders.

8.1 Allocation of the total revenue to reference services

Rule 93 governs the allocation of the total revenue to reference services. The total revenue is to be allocated between reference and other services in the ratio in which costs are allocated between reference and other services (Rule 93(1)).

WAGN does not provide other services using the WAGN GDS, and all total revenue during the Third Access Arrangement Period has been attributed to the provision of the reference services

8.2 Meter lock, deregistration, disconnection and reconnection

The following are offered as part of the Reference Services:

- apply Meter Lock – a Meter lock is applied to the Meter at a Delivery Point at which a User is entitled to take delivery of Gas under Service B3;
- remove Meter Lock – a Meter lock is removed from a Meter at a Delivery Point at which a User is entitled to take delivery of Gas under a Service B3;
- deregistration – effects permanent removal of a Meter from a Delivery Point and termination of the association of a User with the Delivery Point;
- disconnection – the supply of Gas at a Delivery Point at which a User is entitled to take delivery of Gas under Service B2 or Service B3 is disconnected; and
- reconnection – recommences the supply of Gas at the Delivery Point at which a User is entitled to take delivery of Gas under Service B2 or Service B3 and at which a Disconnection Service has previously been supplied.

Costs associated with the provision of ancillary services have not been included in the calculation of Total Revenue.

8.3 Prudent discounts NGR 96(2)

The approval of a discount for a particular user or a particular class of users or prospective users is allowable under Rule 96 subject to the approval the ERA. In particular, Rule 96(2) states:

The [ERA] may only approve a discount under this rule if satisfied that:

(a) the discount is necessary to:

(i) respond to competition from other providers of pipeline services or other sources of energy; or

(ii) maintain efficient use of the pipeline; and

(b) the provision of the discount is likely to lead to reference or equivalent tariffs lower than they would otherwise have been.

Prudent discounts have been offered by WAGN since the introduction of the first Access Arrangement in recognition of a) the fact that haulage tariffs already in existence may have been based on a different pricing mechanism as established under the Gas Distribution Regulations 1998 and b) to mitigate excessive price shock resulting from one charging mechanism to another.

During the first access arrangement WAGN did not receive any recompense for revenues foregone as a result of offering prudent discounts. During the second access arrangement, prudent discounts continued to be in place in respect of a number of delivery points mainly receiving Reference Service A1 but also in more limited circumstances Reference Service A2. The discounted tariffs were recognised as prudent discounts in that the revenues received contributed to fixed costs and in the absence of the discounts the reference tariffs would have been higher.

Although WAGN has continued to move discounted tariffs towards reference tariff pricing there remain delivery points which a) have both significant gas consumption and are located close enough to a transmission pipeline to warrant a direct connection or alternatively b) are located so remotely from a transmission pipeline that the decision to use gas as an energy source would not be economically rational if the decision were to be for a greenfields site.

In all cases where physical bypass is a potential issue, WAGN calculates:

- the total engineering cost of constructing a bypass pipeline using a physical route. The physical route will be greater than the interconnection distance used for the purposes of reference tariff pricing because the latter is based on interconnecting at the nearest point on the closest transmission pipeline;
- cost of metering facilities to interconnect to the nearest transmission pipeline;
- minimum meter set and telemetry requirements for the delivery point; and
- non avoidable operating and maintenance costs.

Capital costs are amortised to determine an annual charge which is added to variable charges. While recovery of these costs is expressed on a per GJ basis, a significant take or pay obligation applies in recognition of the high cost of connection.

WAGN has adopted a non discriminatory policy on the offering of discount tariffs. If a request is received to consider a discount tariff based on physical bypass then the discount tariff will be made available to any User who enquires about access to the delivery point in question. The tariff may not be the same in each case because it may vary depending on the assumed load and term of contract but the basis for determining the tariff is the same. If the same terms and conditions are sought then the discount tariff will be the same.

Forecast revenues resulting from discounted tariffs are set out in Table 71.

Table 71 Revenue from reference services provided at discounted tariffs ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
Revenue	1.851	3.218	3.184	3.363	3.533

[Deleted – Confidential]

Table 72 [Deleted – Confidential]

[Deleted – Confidential]

8.4 Working Capital

WAGN has included the forecast cost of working capital in the total revenue for the WAGN GDS for the third access arrangement period.

The scheme of economic regulation in the National Gas Rules (NGR) does not make specific reference to the cost of working capital used by a service provider, and Rule 76 does not list the cost of working capital among the components of total revenue.

Nevertheless, when exercising a discretion in approving or making those parts of an access arrangement relating to a reference tariff, the regulator must take into account the revenue and pricing principles of section 24 of the National Gas Law (NGL) (section 28(2)). Section 24(2) requires that a service provider be provided with a reasonable opportunity to recover at least the efficient costs which it incurs in:

- providing reference services; and

- complying with a regulatory obligation or requirement or making a regulatory payment.

The efficient costs which a service provider can be expected to incur will include the efficiently incurred costs of financing provision of the reference services. These efficiently incurred financing costs clearly include the costs of financing the physical assets used to provide those services. Rule 76 requires that the total revenue for each year of the access arrangement period be determined using the building block approach, in which one of the building blocks is the cost of financing the capital base (the return on the projected capital base). These efficiently incurred financing costs should also include the efficiently incurred costs of financing working capital.

An allowance for working capital was included in the total revenue from which reference tariffs were determined for the revisions to the Access Arrangement for the MWSW GDS which was approved by the ERA in July 2005.

In approving these revisions, the ERA noted, in respect of working capital:

- the Code did not explicitly address the recovery of the cost of working capital through reference tariffs, although certain of its provisions provided implicit support for the inclusion of a return on working capital in the total revenue;
- the cost of working capital was a financing cost, to be determined by applying the rate of return to a quantum of working capital;
- the quantum of working capital should be calculated using generally accepted industry practice (if such exists), and the amount so calculated should be added to the capital base; and
- working capital, treated in this way, is a non-depreciable asset.

The ERA has subsequently reaffirmed its position on working capital in its October 2009 Draft Decision on revisions to the Access Arrangement for the Goldfields Gas Pipeline, and in its December 2009 Final Decision on Western Power's Access Arrangement for the South West Interconnected Network.

WAGN has therefore made an estimate of working capital, for each year in the period 2010(1) to 2013/14 using generally accepted industry practice. These estimates have been made as follows.

The expenditure and revenue categories impacting on working capital requirements have been identified. These are detailed below:

- receivables – receivables days are based on average days of total haulage revenue for all tariff classes are estimated to be outstanding. An assessment of days outstanding has been determined from receivables for the period July 2008 to June 2009 which results in an average of 17 days which aligns with the billing period being twice monthly

- inventory – inventory days are based on the average inventory balance recorded between October 2008 to November 2009 divided by total CAPEX for calendar 2009 plus OPEX calendar 2009 less UAFG calendar 2009 which results in days outstanding.

- prepayments – prepayment days are based on the average balance for financial year 2009 divided by total CAPEX calendar 2009 plus OPEX calendar 2009 less UAFG calendar 2009 resulting in 3 days outstanding.

- creditors – the days outstanding are based on standard creditor terms of 30 days from month end of month of invoice resulting in a term of 45 days. The creditor value is 45 days of CAPEX and OPEX expenditure.

- unbilled gas – at any point in time WAGN will have performed B2 and B3 reference services but not billed Users for them. WAGN has therefore incurred expenditure but not recouped the associated revenue. This timing difference in cashflows must be financed. B3 and B2 customers are billed on a three monthly basis so it is assumed on average there is 45 days of consumption unbilled. B1 reference services are billed monthly and it is assumed on average there is 15 days unbilled revenue. This gives an average of 41.18 days of B1,B2, B3 revenue.

- Capital WIP – WIP was based on the average amount payable to the capex contractor accrued from November 2008 to November 2009 divided by CAPEX for calendar 2009. This results in 14 days of CAPEX expenditure in WIP.

WAGN's cash flow cycle is summarised in Table 73.

Table 73 Working capital "days"

	Days
Receivables	17
Inventory	2
Prepayments	3
Creditors	-45
Unbilled gas (accrued revenue B1, B2 , B3 days only)	41
Capital work in progress	14

The cost of working capital has then been determined by applying the rate of return (see section 7 of this submission) to the number of days in the relevant cycle over the number of days in the period multiplied by the value attributed to each category of revenue and expenditure.

Table 74 [Deleted – Confidential]

In effect, WAGN has treated its requirement for working capital as an asset required for the provision of reference services using the WAGN GDS. WAGN has not, however, treated that asset as a depreciable asset.

8.5 Efficiency gains

During the second access arrangement period, WAGN proposed incentive mechanisms in respect of:

- user initiated capital expenditure including the costs of meters, services pipes and subdivision reticulation, and
- non-capital costs.

8.5.1 User initiated capital expenditure

An efficiency gain (or loss) in respect of user initiated capital expenditure in respect of small use gas connections reflects the reduction (increase) in financing costs resulting from the difference between the actual and benchmark assumption for user initiated capital expenditure in each calendar ear. The financing savings are calculated by multiplying the rate of return implicit in the reference tariffs of the second access arrangement period by the capital expenditure saving.

Table 75 summarises the gains and losses achieved during the second access arrangement period. The actual cost of connections has been higher than the regulatory

benchmark in years 2005 to 2007. In 2008, the costs of connection were lower than the benchmark. It should be noted that during this period in WA, significant increase in labour and materials were experienced.

Table 75: Efficiency gains: user initiated capital expenditure ($ million, December 2009)

	2005	2006	2007	2008	2009
Adjusted CAPEX benchmark	25.754	28.429	25.951	23.319	-
Actual user initiated CAPEX	27.136	31.833	28.664	23.131	-
Incremental gain	-1.382	-3.404	-2.713	0.188	-
Financing gain	-0.094	-0.231	-0.184	0.013	-

Table 76 below demonstrates how the user initiated capital expenditure financing gain is carried across to the third access arrangement period.

Table 76 Carryover of efficiency gains: user initiated capital expenditure ($ million, December 2009)

	2005	2006	2007	2008	2009	2010(1)	2010/11	2011/12	2012/13	2013/14
Financing gain	-0.094	-0.231	-0.184	0.013	0.000					
Carry over from 2005		-0.094	-0.094	-0.094	-0.094	-0.094				
Carry over from 2006			-0.231	-0.231	-0.231	-0.231	-0.231			
Carry over from 2007				-0.184	-0.184	-0.184	-0.184	-0.184		
Carry over from 2008					0.013	0.013	0.013	0.013	0.013	
Efficiency gain						**-0.496**	**-0.402**	**-0.171**	**0.013**	**0.000**

8.5.2 Non-capital costs

An efficiency gain (or loss) in respect of Non Capital Costs is calculated for each calendar year by comparing the difference between the actual Non Capital Costs and the benchmark Non Capital Costs. It is assumed that no further productivity gain is achieved between the penultimate and last years of the second access arrangement period.

The expenditure benchmarks have been adjusted to take into account:

- changes in the scope of the activities which form the basis of the determination of the original benchmarks; and
- the difference between forecast and actual growth by adjusting the original benchmarks on the basis of the difference between the actual number of connections in any year and the assumed number of connections for that year.

The efficiency gains achieved in respect of non-capital costs are shown in Table 77.

Table 77 Efficiency gains: non-capital costs ($ million, December 2009)

	2005	2006	2007	2008	2009
Adjusted benchmark OPEX		44.816	44.336	43.544	42.709
Actual OPEX		40.502	41.453	41.299	37.854
Underspending		4.314	2.883	2.244	4.854
Efficiency gain		**4.314**	**-1.431**	**-0.639**	**2.610**

An adjustment to non capital costs has been made to take into account the impact of customer connections in excess of the regulatory benchmark. Table 78 below demonstrates how the non-capital cost efficiency gains are carried across to the third access arrangement period.

Table 78 Carryover of efficiency gains: non-capital costs ($ million, December 2009)

	2005	2006	2007	2008	2009	2010(1)	2010/11	2011/12	2012/13	2013/14
Efficiency gain	4.314	-1.431	-0.639	2.610	0.000					
Carry over from 2005		4.314	4.314	4.314	4.314	4.314				
Carry over from 2006			-1.431	-1.431	-1.431	-1.431	-1.431			
Carry over from 2007				-0.639	-0.639	-0.639	-0.639	-0.639		
Carry over from 2008					2.610	2.610	2.610	2.610	2.610	
Efficiency gain						**4.854**	**0.540**	**1.971**	**2.610**	**0.000**

8.5.3 Efficiency gains

Table 79 summarises the impacts of the gains (and losses) made in respect of both the user initiated capital expenditure incentive mechanism and the non-capital cost incentive mechanism. These amounts result in a net efficiency gain which has been added to the total revenue for the third access arrangement period.

Table 79 Carryover of efficiency gains ($ million, December 2009)

	2010(1)	2010/11	2011/12	2012/13	2013/14
Efficiency gains carried over	2.179	2.248	0.969	2.211	1.311

9 REFERENCE TARIFF DETERMINATION

The Access Arrangement revisions proposal sets out proposed (revised) tariffs for each of the five reference services described in the preceding section of this submission. These tariffs – the proposed revised reference tariffs – are to apply from 1 July 2010, and may subsequently be varied in accordance with the methods and formulae of the reference tariff variation mechanism set out in the Access Arrangement.

The reference tariff variation mechanism is discussed in section 15 of this submission. WAGN's approach to the determination of the proposed revised reference tariffs is explained in the following paragraphs of this section 3.

9.1 New scheme for reference tariff determination

The NGL and the NGR establish a scheme for reference tariff determination. For gas distribution pipeline systems, this scheme is different in number of significant ways to the scheme of the Code.

Rule 94 prescribes the way in which reference tariffs are to be set for gas distribution pipeline systems. The rule has six parts:

(1) For the purpose of determining reference tariffs, customers for reference services provided by means of a distribution pipeline must be divided into tariff classes.

(2) A tariff class must be constituted with regard to:

(a) the need to group customers for reference services together on an economically efficient basis; and

(b) the need to avoid unnecessary transaction costs.

(3) For each tariff class, the expected revenue to be recovered should lie on or between:

(a) an upper bound representing the stand alone cost of providing the reference service to customers who belong to that class; and

(b) a lower bound representing the avoidable cost of not providing the reference service to those customers.

(4) A tariff, and if it consists of 2 or more charging parameters, each charging parameter for a tariff class:

(a) must take into account the long run marginal cost for the reference service or, in the case of a charging parameter, for the element of the service to which the charging parameter relates;

(b) must be determined having regard to:

(i) transaction costs associated with the tariff or each charging parameter; and

(ii) whether customers belonging to the relevant tariff class are able or likely to respond to price signals.

(5) If, however, as a result of the operation of subrule (4), the service provider may not recover the expected revenue, the tariffs must be adjusted to ensure recovery of expected revenue with minimum distortion to efficient patterns of consumption.

(6) The AER's discretion under this rule is limited.

WAGN's application of Rule 94 in the determination of the proposed revised reference tariffs for the reference services provided using the WAGN GDS is explained in the following paragraphs of this Access Arrangement Information.

In setting reference tariffs for the WAGN GDS, WAGN must also satisfy the requirements of the National Gas Access (WA) (Local Provisions) Regulations 2009. These requirements are considered in the final subsection of this section of this Access Arrangement Information.

9.2 Tariff classes

Rule 94(1) requires that, for tariff determination, customers for reference services be divided into tariff classes. "Tariff class" is a new concept. It is defined, in Rule 69, as the customers for a reference service who constitute a tariff class under a full access arrangement.

A reference service is provided to a user at each delivery point on the WAGN GDS. WAGN has, therefore, taken WAGN GDS delivery points as representing customers. By treating delivery points as customers, each customer is a customer in relation to only one reference service because only one reference service is provided at each delivery point.

About 600,000 customers are supplied with gas from the WAGN GDS.

A small number of these customers (about 40) require relatively large volumes of gas (in excess of 35 TJ/year) supplied at high or medium pressures (above 300 kPa). These customers require haulage service through the high pressure and medium pressure parts

of the WAGN GDS which is essentially the same as the haulage service required by other customers. However, they require gas delivery into plant and equipment which is customer specific and, for this, they must be provided with user specific delivery facilities – service pipes, regulators, and metering equipment – designed and constructed to deliver gas into their customer specific plant and equipment. The user specific delivery facilities must also be designed and constructed to accommodate the peak flows of 10 GJ/hour or more required by these customers, and to allow remote monitoring using telemetry as required by the Retail Market Rules.

These large use customers are provided with reference service A1, and can be grouped together as a single tariff class – tariff class A1.

Approximately 80 customers require volumes of gas in excess of 10 TJ/year but less than 35 TJ/year. These customers require haulage service through the high pressure and medium pressure parts of the WAGN GDS which is essentially the same as the haulage service required by other customers. However, they require gas delivery into plant and equipment which is customer specific and, for this, they must be provided with user specific delivery facilities designed and constructed to deliver gas into their customer specific plant and equipment. The user specific delivery facilities must be designed and constructed to accommodate the peak flows of at most 10 GJ/hour which are required by these customers, and to allow remote monitoring using telemetry as required by the Retail Market Rules. This second group of larger use customers are provided with reference service A2, and are a single tariff class – tariff class A2.

Some 1,100 customers require volumes of gas which do not exceed 10 TJ/year, and require Contract Peak Rates which are less than 10 GJ/hour. These customers require haulage service through the high pressure and medium pressure parts of the WAGN GDS which is essentially the same as the haulage service required by tariff class A1 and tariff class A2 customers. They also require gas delivery into plant and equipment which is customer specific and, for this, they must be provided with user specific delivery facilities designed and constructed to deliver gas into their customer specific plant and equipment. The user specific delivery facilities must be designed and constructed to accommodate the peak flows of at most 10 GJ/hour which are required by these customers. However, because their annual requirements do not exceed 10 TJ/year, these customers do not require remote monitoring, using telemetry, of metering at delivery points. These 1,100 customers are provided with reference service B1, and can be grouped together as a single tariff class – tariff class B1.

The remainder of the customers (some 599,000) require relatively small volumes of gas for commercial and residential use. They can be supplied from the high pressure, the medium pressure and the low pressure parts of the WAGN GDS, and require haulage service essentially the same as the haulage service required by tariff class A1, tariff class

A2 and tariff class B1 customers. Their requirements for relatively small volumes at low pressures allow these customers to be supplied using standardised delivery facilities.

Around 7,000 of these small use customers require somewhat larger volumes, and gas deliveries at higher peak rates, than the remainder. All of these customers can be supplied using up to 20 metres of service pipe, a standard pressure regulator and a standard 12 m^3/hour meter. These 7,000 customers are provided with reference service B2, and can be grouped together as a single tariff class – tariff class B2.

The remainder of the small use customers (approximately 592,000 customers) can be supplied using up to 20 metres of service pipe, a standard pressure regulator and a standard small use meter rated at 6 to 8 m^3/hour. These customers are provided with reference service B3, and can be grouped together as a single tariff class – tariff class B3.

The grouping of customers into tariff classes which correspond to the existing structure of reference services can be carried out, as required by Rule 94(2), on an economically efficient basis and in a way which avoids unnecessary transaction costs.

9.3 Charging parameters for each tariff class

Once customers have been divided into tariff classes, the reference tariff payable by the customers in each tariff class is to be determined in accordance with Rule 94(4). Each of the reference services provided using the WAGN GDS can be divided into a number of elements, and a charging parameter can be assigned to each of these elements. The reference services offered by WAGN, and the tariff classes, reference tariffs, service elements and charging parameters associated with each of these reference services, are set out in Table 80.

Table 80 WAGN GDS reference services, tariff classes, reference tariffs, service elements and charging parameters

Reference service Tariff class Reference tariff	Service element	Charging parameter
A1	Use of distribution system capacity	Standing charge
	Haulage	Demand charge
	Haulage	Usage charge
	Provision of service pipe, regulators, metering and telemetry	User specific charge
A2	Use of distribution system capacity	Standing charge
	Haulage	Usage charge
	Provision of service pipe, regulators, metering and telemetry	User specific charge
B1	Use of distribution system capacity	Standing charge

	Haulage Provision of service pipe, regulators, metering and telemetry	Usage charge User specific charge
B2	Use of distribution system capacity Haulage	Standing charge Usage charge
B3	Use of distribution system capacity Haulage	Standing charge Usage charge

The existing structure of the reference tariff for each reference service has been retained as the structure of the proposed revised reference tariff for each tariff class. The reference tariff for each tariff class will have a standing charge and a usage charge. In addition, reference tariffs A1, A2 and B1 will have a further charging parameter – a user specific charge – which varies between customers in accordance with individual requirements for user specific delivery facilities. Reference tariff A1 will have a third charging parameter – a demand charge – which is related to the distance from the nearest transmission pipeline, and is designed to avoid inefficient bypass of the WAGN GDS.

9.4 Reference tariff determination

Rule 94 requires a sequential approach to reference tariff determination, and proposed revised reference tariffs for the MWSW GDS have been determined by applying the sequence of four steps set out in the paragraphs which follow. (Under the scheme of the NGL and NGR, reference tariffs for distribution pipelines are not determined by allocating costs to reference services as was the case under the Code.)

Reference tariff determination: Step 1

First, the tariff for each tariff class is determined as a multipart tariff with:

- the standing charge determined as the long run marginal cost of providing distribution system capacity and connectivity, and
- the usage charge (and, in the case of Reference Tariff A1, the demand charge) set to provide a contribution to recovery of total revenue.

The usage charge is, in effect, an “entry fee”. Once a user has paid the entry fee of the reference tariff, it is free to use the corresponding reference service to an extent which is determined solely by the level of the standing charge (which is, in turn, determined from long run marginal cost).

The usage charges (and, in the case of Reference Tariff A1, the demand charge) have been set at the levels at which the revenue from those charges (for all reference services)

recovers the amount by which the total revenue (the total cost of providing all haulage services) exceeds the expected revenue from standing charges.

Reference tariff determination: Step 2

Once an initial tariff has been determined for a tariff class (Step 1), the expected revenue from that tariff has been compared, in accordance with Rule 94(3), with:

- the stand alone cost of providing the corresponding reference service to customers in that tariff class; and
- the avoidable cost of providing the reference service to those customers.

If, for any tariff class, the revenue expected to be recovered at the tariff determined in Step 1 exceeds the stand alone cost of providing reference services to customers who belong to that tariff class, the tariff must be reduced, by reducing the standing charge, until the stand alone cost test of Rule 94(3) is satisfied.

If, for any tariff class, the revenue expected to be recovered at the tariff determined in Step 1 is less than the avoidable cost of not providing the reference service to customers in that tariff class, the tariff must be increased, by increasing the standing charge, until the avoidable cost test of Rule 94(3) is satisfied.

Reference tariff determination: Step 3

Section 24 of the NGL sets out revenue and pricing principles which must be taken into account by the ERA when exercising a discretion in approving those parts of an access arrangement relating to a reference tariff. In accordance with the principle of section 24(2):

A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in –

(a) providing reference services; and

(b) complying with a regulatory obligation or requirement or making a regulatory payment

There is, however, no reason why a set of tariffs determined using long run marginal costs as required by Rule 94(4), and satisfying the stand alone and avoidable cost tests of Rule 94(3), should provide the service provider with the opportunity to recover the efficient costs incurred in providing the reference services and in complying with its regulatory obligations. If this is the case, a further mechanism for adjustment is required in the tariff determination process. That mechanism would seem to be in Rule 94(5).

Rule 94(5), as it stands, contains an error. If, as the rule indicates, expected revenue is an amount which is calculated by applying a tariff determined in accordance with Rule 94(4), it is not an amount which the service provider may or may not recover. It is not, in any sense, a revenue target. The amount which the service provider should be able to recover via reference tariffs – the relevant revenue target – is that part of the total revenue allocated to reference services. That part of the total revenue allocated to reference services is the total of the efficient costs of incurred in providing the reference services and in complying with the service provider's regulatory obligations. It is the amount which the regulator must take into account when exercising a discretion in approving those parts of an access arrangement relating to a reference tariff in accordance with section 24(2) of the NGL. The references, in Rule 94(5), to "expected revenue" should, instead, be references to "that part of the total revenue allocated to reference services". Rule 94(5) should read:

If, however, as a result of the operation of subrule (4), the service provider may not recover that part of the total revenue allocated to reference services, the tariffs must be adjusted to ensure recovery of that part of the total revenue allocated to reference services with minimum distortion to efficient patterns of consumption.

That part of the total revenue allocated to reference services is to be determined in accordance with Rule 76 and Rule 93. Rule 76 specifies the components of total revenue. Rule 93 governs the allocation of the total revenue between reference and other services. The total revenue which WAGN has determined is wholly attributable to the WAGN GDS; no part of it is allocated to other services.

If, when tariffs are determined in the way set out in Steps 1 and 2 above, the service provider is unable to recover that part of the total revenue allocated to reference services, the tariffs so determined must be adjusted, in accordance with Rule 94(5), to ensure recovery of that part of the total revenue allocated to reference services in a way which minimises distortion to efficient patterns of consumption. WAGN has interpreted Rule 94(5) as requiring that, should usage charges have to be increased, the charges for those reference services for which the demands are least elastic should be increased by the largest amount.

Reference tariff determination: Step 4

If the tariffs calculated at Step 3 satisfy the stand alone and avoidable costs tests of Rule 94(3), they are the required reference tariffs. If they do not satisfy those tests, further adjustments must be made to ensure that all of the requirements of Rule 94 are satisfied, and the service provider has the opportunity to recover that part of the total revenue allocated to reference services.

Steps 1 to 4 yield reference tariffs which satisfy the requirements of Rule 94(4)

The structure of reference tariffs set out in Table 80, with the charging parameters determined in the way described above (the standing charges set at the long run marginal costs of providing the reference services, and the usage charges set to provide contributions to recovery of total revenue) satisfies the requirements of Rule 94(4):

- account is taken of long run marginal costs;
- there are no significant transaction costs associated with each charging parameter; and
- since each reference tariff comprises a fixed charge and a volume-related charge, customers in each tariff class are likely to have sufficient information (their histories of gas deliveries) to be able to respond to the price signals provided by the tariff payable by customers in that tariff class.

9.5 Change required by Rule 94

The structure of the reference tariffs applying in the second access arrangement period was essentially unchanged from that established for the initial access arrangement period. Furthermore, although the total revenue was higher in the second access arrangement period, leading to higher tariffs, the way in which that total revenue was allocated to reference tariffs was essentially unchanged from the allocation which had been adopted for the initial access arrangement period. The structure of tariffs established for the initial access arrangement period, and the allocation of total revenue to those tariffs, provided a set of gas distribution tariffs which were consistent with the gas retail tariffs prevailing at that time and which were to remain (at that time) unchanged.

In consequence, the total revenue of the WAGN GDS was allocated to users of reference services on the basis of gas volumes transported through the distribution system, and the reference tariffs had the declining block structure commonly used by integrated gas retailers. The reference tariffs established for the initial and second access arrangement periods provided the service provider with a reasonable opportunity of recovering at least its efficient costs, but could not provide signals for efficient investment in, and for efficient operation and use of, the WAGN GDS.

Rule 94 precludes this outcome by requiring that reference tariffs be constructed in such a way that they provide proper signals for efficient investment in, and for efficient operation and use of, distribution pipeline systems. Tariffs constructed in accordance with Rule 94 are unlikely to be consistent with the retail tariffs determined by an integrated gas retailer.

Distribution pipeline system costs and, in particular, the costs of developing, operating and maintaining the WAGN GDS, are not closely related to the volume of gas transported. Those costs vary with the capacity which is provided in the various parts of a

distribution pipeline system, and with the (very large) number of points at which end-users can connect to the system and take delivery of the gas transported. Future requirements for capacity and connectivity, and not for additional volumes delivered, are the primary determinants of the distribution pipeline system long run marginal costs which are to be the basis of reference tariffs determined in accordance with Rule 94.

Accordingly, WAGN has determined, for each of the reference services provided using the WAGN GDS during the third access arrangement period, the incremental cost of connecting the forecast increase in the number of customers requiring the service. This incremental cost comprises the incremental capital costs (return and depreciation), and the incremental operating costs. The ratio of the incremental cost to the increase in service requirement (the product of the number of new connections and the system capacity required to support each connection), has been taken as the long run marginal cost of providing the reference service in question using the WAGN GDS.

This long run marginal cost is not directly related to volume. It is related to the change in number of connections to the WAGN GDS. Its economic focus is not the end-user of gas, but a prospective user of the distribution system: it provides the correct signal to the prospective user in terms of the efficient cost of an additional connection to the WAGN GDS.

WAGN has, therefore, sought to determine the standing charge component of each reference tariff from the long run marginal cost of providing the corresponding reference service. The usage charge has then been determined as the volume-related charge which allows WAGN the opportunity to recover its total revenue.

9.6 First tariff estimates, the tests of Rule 94(3), and tariff adjustment in accordance with Rule 94(5)

When the tariffs for the WAGN GDS are established using the long run marginal costs of the reference services as the standing charges, and a usage charge set to recover (approximately) the remainder of total revenue, those tariffs are as shown in Table 81.

Table 81 WAGN GDS first tariff estimates ($, December 2009)

Reference tariff	Charging parameter	Units	Estimate
A1	Standing charge	$/year	220,475.91
	Demand charge	$/GJ km	
	Usage charge	$/GJ	0.04
A2	Standing charge	$/year	16,117.24
	Usage charge	$/GJ	0.04
B1	Standing charge	$/year	5,045.49

	Usage charge	$/GJ	0.04
B2	Standing charge	$/year	573.11
	Usage charge	$/GJ	2.00
B3	Standing charge	$/year	225.61
	Usage charge	$/GJ	2.00

The first tariff estimates of Table 81 are very different from the reference tariffs prevailing at the end of the second access arrangement period.

These tariffs satisfy the stand alone and avoidable cost tests of Rule 94(3), as shown in Table 82. However, if they were to be implemented, they would not allow WAGN to recover its total revenue over the access arrangement period.

Table 82 Expected revenues, stand alone costs, avoidable costs and total revenue* ($ million, December 2009)

Reference tariff	Revenue, cost	$ million	Test
A1	Expected revenue	38.400	
	Stand alone cost	241.228	Satisfied
	Avoidable cost	5.107	Satisfied
A2	Expected revenue	9.072	
	Stand alone cost	361.203	Satisfied
	Avoidable cost	1.687	Satisfied
B1	Expected revenue	23.830	
	Stand alone cost	436.696	Satisfied
	Avoidable cost	3.670	Satisfied
B2	Expected revenue	24.119	
	Stand alone cost	449.486	Satisfied
	Avoidable cost	3.156	Satisfied
B3	Expected revenue	504.832	
	Stand alone cost	591.148	Satisfied
	Avoidable cost	58.067	Satisfied
All tariffs	Expected revenue	600.252	Total revenue not recovered
	Total revenue	613.223	

* Expected revenues, total revenue, stand alone and avoidable costs are all expressed as present values of costs/revenues in each year of the access arrangement period. The present values have been calculated using the rate of return as the discount factor.

Moreover, their implementation would be likely to result in significant price shock, particularly for end-users of gas supplied using Service B2 and Service. These end-users are the small use customers which are to be protected by the National Gas Access (WA) (Local Provisions) Regulations.

WAGN has therefore determined the reference tariffs for the WAGN GDS by adjusting these first tariff estimates so that:

- price shock is avoided, while allowing tariffs to partially adjust toward the first tariff estimates over the access arrangement period;
- the charges for those reference services for which the demands are least elastic are increased by the largest amounts so as to minimise distortion to efficient patterns of consumption in accordance with Rule 94(5); and
- the present value of the expected revenue from the resulting reference tariffs is equal to the present value of total revenue.

The reference tariffs so determined are set out in Table 83.

Table 83 WAGN GDS reference tariffs ($, December 2009)

Reference tariff	Charging parameter	Units	1-Jan-2011	1-Jul-2011	1-Jul-2012	1-Jul-2013
A1	Standing charge	$/Year	46,476.23	48,800.04	51,240.04	53,802.04
	Demand charge					
	First 10 km	$/GJ km	182.86	192.00	201.60	211.68
	Distance > 10 km	$/GJ km	91.43	96.00	100.80	105.84
	Usage charge					
	First 10 km	$/GJ km	0.044600	0.046830	0.049170	0.051630
	Distance > 10 km	$/GJ km	0.022300	0.023420	0.024590	0.025820
A2	Standing charge	$/Year	34,115.00	35,820.75	37,611.79	39,492.38
	Usage charge	$/GJ	2.20	2.31	2.43	2.55
B1	Standing charge	$/Year	1,165.50	1,223.78	1,284.97	1,349.22
	Usage charge	$/GJ	5.34	5.61	5.89	6.18
B2	Standing charge	$/Year	270.00	283.50	297.68	312.56
	Usage charge	$/GJ	7.00	7.35	7.72	8.11
B3	Standing charge	$/Year	70.00	72.80	77.90	83.35
	Usage charge	$/GJ	9.50	9.88	10.57	11.31

The reference tariffs in Table 83 satisfy the stand alone and avoidable cost tests of Rule 94(3), as shown in Table 84. They also allow WAGN to recover its total revenue over the third access arrangement period.

Table 84 Expected revenues, stand alone costs, avoidable costs and total revenue* ($ million, December 2009)

Reference tariff	Revenue, cost	$ million	Test
A1	Expected revenue	23.578	
	Stand alone cost	241.228	Satisfied
	Avoidable cost	5.107	Satisfied
A2	Expected revenue	25.411	
	Stand alone cost	361.203	Satisfied
	Avoidable cost	1.687	Satisfied
B1	Expected revenue	37.106	
	Stand alone cost	436.696	Satisfied
	Avoidable cost	3.670	Satisfied
B2	Expected revenue	35.621	
	Stand alone cost	449.486	Satisfied
	Avoidable cost	3.156	Satisfied
B3	Expected revenue	491.507	
	Stand alone cost	591.148	Satisfied
	Avoidable cost	58.067	Satisfied
All tariffs	Expected revenue	613.223	Total revenue recovered
	Total revenue	613.223	

* Expected revenues, total revenue, stand alone costs and avoidable costs are all expressed as present values of costs/revenues in each year of the access arrangement period. The present values have been calculated using the rate of return as the discount factor.

9.7 Compliance with National Gas Access (WA) (Local Provisions) Regulations 2009

The National Gas Access (WA) (Local Provisions) Regulations 2009 were proclaimed on 30 December 2009 and became operational from 1 January 2010. They take precedence over the National Gas Law and National Gas Rules as implemented under the National Gas Access (WA) Act 2009.

These regulations seek to influence the structure of reference tariffs and reference tariff variation mechanism to ensure that government policy on energy tariffs can be implemented. It is noted that no similar mechanism or constraint in other Australian jurisdictions.

Regulation 6(1) of National Gas Access (WA) (Local Provisions) Regulations 2009 requires the following.

The ERA must not approve or make an access arrangement for a distribution pipeline if the reference tariff for any small delivery service provided for in the access arrangement varies according to the geographical location of the small delivery point to which the gas is delivered.

A small delivery service is provided to a small use gas consumer which refers to a delivery point at which a gas consumer uses less than 1TJ per annum. The reference service which generally applies to small use gas consumers is the B3 service and this is the haulage service provided to a typical residential premise. In constructing the reference services and associated tariffs, WAGN has not sought to differentiate pricing on the basis of geographic location. WAGN has complied with Regulation 6.

A further constraint on tariff construction is applied Regulation 7of National Gas Access (WA) (Local Provisions) Regulations 2009 which requires that:

(1) When exercising a discretion in approving or making an access arrangement for a distribution pipeline the ERA must take into account the possible impact of the proposed reference tariffs, the method of determining the tariffs and the reference tariff variation mechanisms on –

(a) users to whom gas is or might be delivered by means of a small delivery service provided for in the access arrangement; and

(b) small use customers to whom gas is or might be delivered by those users.

(2) In sub regulation (1) a reference to the impact of something is not limited to the economic impact of that thing.

(3) A requirement under this regulation to take a matter into account applies –

(a) despite anything in the National Gas Law or Rules that would otherwise prevent the matter being taken into account; and

(b) in addition to any requirement under the National Gas Law or Rules –

(i) for any other matter to be taken into account; or

(ii) as to the content of the access arrangement.

(4) For the avoidance of doubt, this regulation does not permit the ERA to approve or make an access arrangement that does not include a reference tariff variation mechanism that complies with rule 92 of the Rules.

WAGN notes that this regulation does not override a service provider's ability to recover its total revenue in present value terms over the access arrangement period. It should

also operate together with Rule 94(5), which allows adjustment of reference tariffs determined in accordance with Rules 94(3) and (4) in a way which minimises distortion to efficient patterns of consumption.

In ensure recovery of the total revenue the total revenue for the third access arrangement period, WAGN has taken into account:

- guiding principles;
- the drivers of costs;
- the consumption profile of reference tariff B3 delivery points; and
- the proportion of total cost that reference tariff comprises of the total retail cost.

Each of these factors is described in further detail below.

9.7.1 Guiding principles

The present value of the total revenue to be recovered over the third access arrangement period is $624.702 million, which represents an increase of 14.4% over the present value of total revenue forecast for the second access arrangement period ($545.839 million, $, December 2009). In accordance with section 24(a) of the NGL (revenue and pricing principles), WAGN must be given a reasonable opportunity to recover its total revenue (its efficient costs, and therefore increases in reference tariffs over the course of the third access arrangement period should be designed to achieve this outcome.

A significant number of delivery points which use Service A1 receive prudent discounts. Increases in reference tariff A1 should, therefore, be kept to the minimum level necessary to ensure that no further discounts are required to retain gas load.

Tariff increases should be determined in a way which provides logical cross over points for users changing from one reference service to another. In applying this principle, the resulting tariffs must fall within the bounds of stand alone and the avoidable cost in accordance with Rule 94(3).

Reference tariffs for the WAGN GDS will remain unchanged from those which were calculated for calendar year 2009, and the first increase in tariffs in the third access arrangement period is expected to occur 1 January 2011. In the absence of a delay in the implementation of the NGL, revised tariffs would have applied from 1 January 2010. Therefore, the tariffs to be implemented on 1 January 2011 should reflect this fact by way of "P_0", or level, adjustment.

9.7.2 Drivers of costs

As discussed in section 9.5, WAGN's costs are not driven by the amount of gas transported but by the costs of capacity and connectivity of delivery points. Existing tariff structures - in particular, the structure of reference tariff B3 - are mainly volume based which results in under recovery of revenues where gas consumption is low. A correction to tariff structure is therefore critical to ensure revenue recovery over the access arrangement period and that tariff structures move to reflect the costs associated with providing the services. This has resulted in changes to fixed charge and a move to a single variable charge for reference services A2, B1, B2 and B3. Notwithstanding this, an attempt to minimise price shock as a result of change in tariff structure has been made by seeking to minimise the impact on as many end use gas consumers as possible.

In the case of reference tariff A1 no change in tariff structure has occurred.

To obtain Service A2, a delivery point must consume at least 10 TJs of gas per annum. Whereas under the current structure the reference tariff for A2 has a small fixed charge, there are 3 volume related tiers in for the first 5TJs, between 5TJs and 10TJs and above 10TJs. The first two tiers have been converted into a fixed charge. Of the volume related charges of which the first 2 tiers are fixed the fixed appears to have increased dramatically but in fact reflects a move towards the treatment of the transport of the first 10 TJs as a fixed charge.

Service B1 has experienced a significant increase in the fixed charge, but resulting overall cost of the service is likely to be well below what might otherwise have been the case.

Service B2 has experienced a relatively small increase in the fixed charge. This is the second largest tariff class in terms of number of delivery points.

The current structure of reference tariff B3 significantly out of alignment with the costs of service delivery. When the reference tariffs where established for the initial access arrangement period, the asset class which incurred the largest reduction in depreciated optimised replacement cost was meters and service pipe. The carry forward value of this asset class was reduced by 66%. The bulk of these assets came to the end of their useful life at 31 December 2009. They are to be replaced and this will mean that current costs and therefore a more realistic cost of service. Nonetheless, while there is economic support for an increase in the fixed component of the reference tariff B3 to in excess of $200, the proposed increase is much more modest.

9.7.3 Consumption profile of reference tariff B3 delivery points

An indication of the consumption profile of the B3 tariff class for both 2005 and 2008 is presented in Figure 6 below. The data shows that the median consumption is in the range of 14 to 16 GJs per annum – note the reduction in the period in average consumption.

Figure 6: Consumption profile for Service B3 2005 and 2008

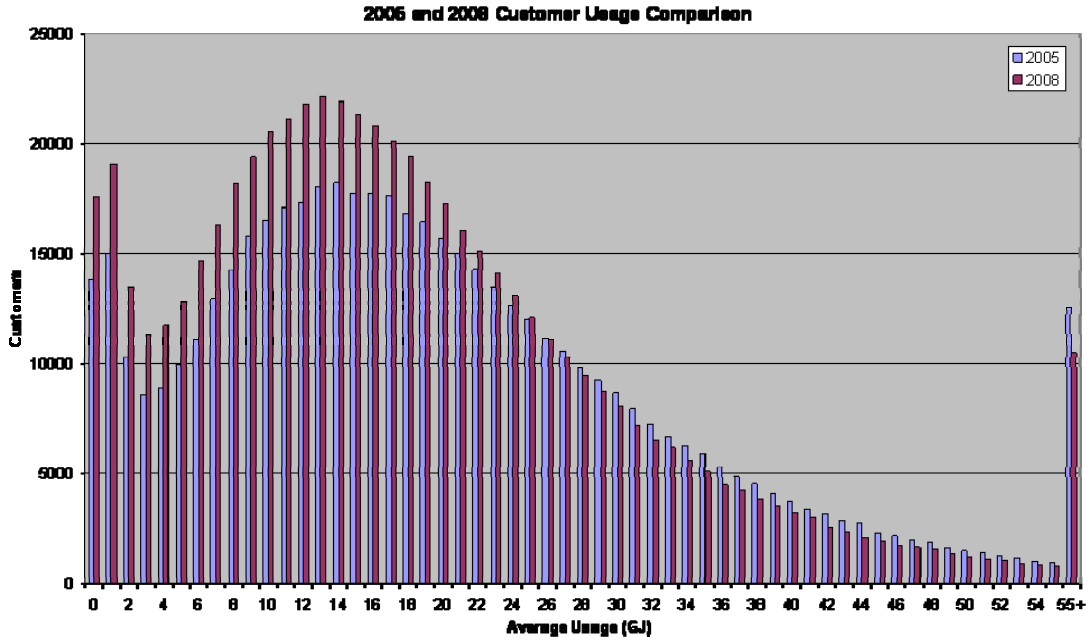


Figure 6 also indicates that there are a number of gas connections at which less than 2 GJs gas are consumed in a year. Annual consumption at this level cannot be encouraged because the costs of connection will never be recovered if the tariff does not reflect a fixed charge commensurate with the costs incurred with connection.

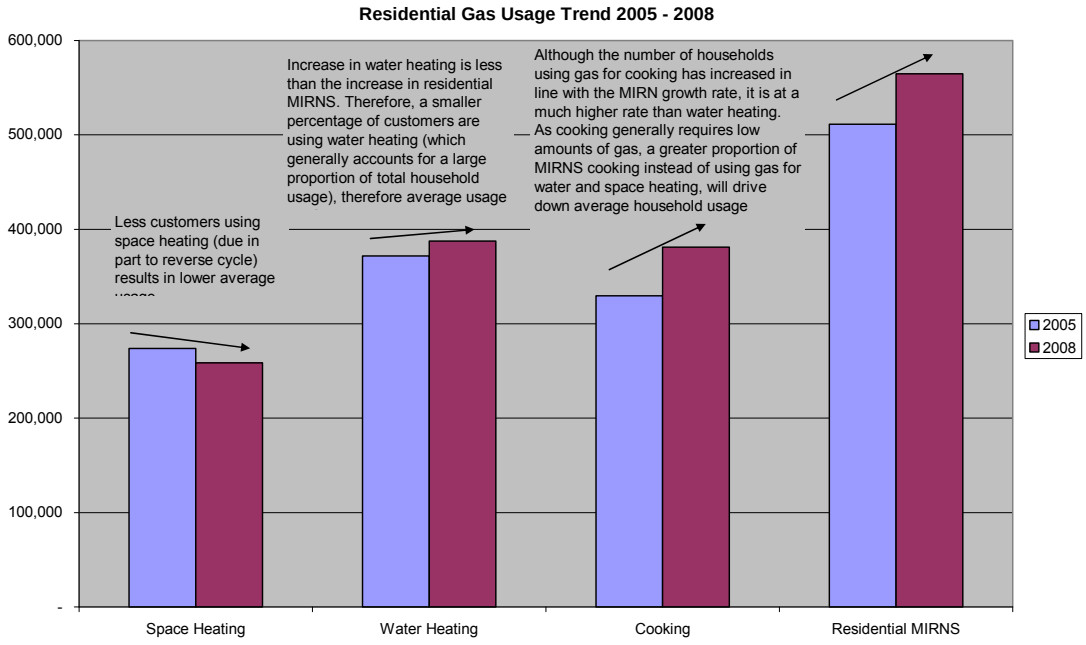
Small use gas consumption arising from the residential market is dependent on the number of gas appliances in a home. There have been a number of factors leading to the reduction in average consumption over time:

- increased efficiency of gas appliances;
- government rebates, both State and Commonwealth, to convert to solar hot water heating;
- use of reverse cycle air conditioners for space heating; and

- below-cost electricity tariffs encouraging use of electricity rather than gas.

Figure 7 below provides an impact analysis of residential gas usage for the period 2005 to 2008. (The data for Figure 7 have been sourced Australian Bureau of Statistics, Environmental Issues: Energy Use and Conservation, Cat. No. 4602.0, 2008.)

Figure 7: residential gas usage



While Regulation 7 is aimed at reducing price shock to small use gas consumers, it is clear that it would be inequitable to continue to recover costs from the median consumers of gas rather than from all connections which have caused costs to be incurred. An increase in the B3 reference tariff will have a greater impact on very low end-users of gas rather than on median users. To do otherwise may cause even the median gas consumers to substitute their current gas consumption with another form because statistics from the ABS indicate that price is a major driver of energy choice.

9.7.4 Reference tariff as a proportion of total retail cost

Retail gas prices for small use gas consumers are currently regulated. The prices do not explicitly accommodate a pass through of WAGN's haulage tariffs. A review undertaken by the Office of Energy identified that the haulage tariff represented around 40% of the retail tariff.[44] On this basis the proposed increase in haulage tariff for the median user of

[44] Office of Energy, *Gas tariff regulations review report*, 2007.

16 GJs per annum will experience an increase of 25% from the end of calendar year 2009 to 2011 or just under 12% year on year. This would be reflected as a 5% increase in retail tariffs for both 2010 and 2011. In contrast, where only 2GJs per annum are consumed, the increase is much more substantial in percentage terms being 87% over 2 years or 37% year on year. However, viewed in absolute dollar terms, the increase is $41.41 per annum from $47.59 to $89.00. This would reflect an increase in retail tariffs of 15%.

WAGN is of the view that these tariff changes do not represent price shock.

10 TARIFF MODEL

A confidential Microsoft Excel spreadsheet model, which calculated total revenue and the revised reference tariffs for the WAGN GDS, is provided with this submission.

WAGN has also provided a public revision of the spreadsheet model which does not disclose confidential information while retaining most of the functionality of the (complete) confidential model.

11 REFERENCE TARIFF VARIATION MECHANISM

Annexure B of the Access Arrangement provides for variation of the reference tariffs:

- in accordance with a formula; and
- as a result of a cost pass through for a defined event.

11.1 Reference tariff variation in accordance with formula

The reference tariffs set out in the preceding section of this Access Arrangement Information are all real, December 2009 dollar values. They must be periodically varied for the effects of inflation during the access arrangement period if WAGN is to have the opportunity of recovering its efficiently incurred – nominal - costs of providing reference services.

The Access Arrangement for the WAGN GDS therefore includes a reference tariff variation mechanism which varies the tariffs set out in Table 85 above for the effects of inflation from December 2009 to each of the dates on which varied tariffs are to come into effect, being 1 January 2011, 1 July 2011, 1 July 2012, and 1 July 2013.

The variation of the reference tariffs for the effects of inflation is effected through formulae set out in Annexure B. The measure of inflation applied in these formulae is the Consumer Price Index, All Groups, Perth.

The formulae set out in Annexure B of the Access Arrangement also progressively vary the reference tariffs for 1 January 2011 (as set out in Table 85), so that the standing charges are partially adjusted toward the corresponding long run marginal costs during the access arrangement period. The adjustments, which apply not only to the standing charges but also to the other charging parameters, are:

- from 1 July 2011, the charging parameters of Tariff A1, Tariff A2, Tariff B1, and Tariff B2 are increased by 5.0% to partially adjust them toward the first tariff estimates; and the charging parameters of Tariff B3 are increased by 4.0%;
- from 1 July 2012, the charging parameters of Tariff A1, Tariff A2, Tariff B1, and Tariff B2 are further increased by 5.0% to partially adjust them toward the first tariff estimates, and the charging parameters of Tariff B3 are further increased by 7.0%; and
- from 1 July 2013, the charging parameters of Tariff A1, Tariff A2, Tariff B1, and Tariff B2 are again increased by 5.0% to partially adjust them toward the first tariff estimates, and the charging parameters of Tariff B3 are increased by 7.0%.

In addition, the formulae of the tariff variation mechanism allow WAGN to recover certain costs which are beyond its control, and which could not be predicted with any great certainty prior to the time at the revisions to the Access Arrangement were approved. The two principal types of cost which can be recovered through the operation of the formulae are:

- unanticipated increases in regulatory costs – the direct and indirect costs of action by agencies of government; and
- the additional costs which arise from unanticipated increases in the price of gas purchased to replace unaccounted for gas (but not from any unanticipated increases in the volume of that replacement gas).

The unanticipated regulatory costs which can be recovered through the formulae of the tariff variation mechanism include both unanticipated regulatory operating expenditures and unanticipated regulatory capital costs. The unanticipated regulatory capital costs are to be depreciated in the usual way, and an annual return is to be allowed on the undepreciated balance at the rate of return. Only the depreciation and return (and not the capital amount) are recoverable via the formulae of the reference tariff variation mechanism.

At the end of the access arrangement period, the undepreciated balance associated with any unanticipated regulatory capital expenditure should be added to the capital base and recovered via future reference tariffs. (It should not be recovered by continued operation of the tariff variation mechanism.)

The formulae of the reference tariff variation mechanism allow an unanticipated increase in uncontrollable (regulatory capital or operating) costs to be recovered during the year following the increase. An adjustment is made, at the rate of return, for the opportunity cost associated with the deferral of cash flow.

The formulae of the reference tariff variation mechanism of Annexure B in effect impose variable caps on the revenue to be derived from the reference the reference services.

11.2 Reference tariff variation as a result of cost pass through

The reference tariff variation mechanism continues and extends the scheme of tariff variation for defined cost pass through events included in the Access Arrangement in 2005. Specific events which give rise to costs which can be recovered through tariff variation for cost pass through are:

- WAGN incurs HHV costs that constitute conforming capital expenditure or conforming operating expenditure;

- WAGN incurs physical gate point costs that constitute conforming capital expenditure or conforming operating expenditure;
- WAGN incurs conforming capital expenditure or conforming operating expenditure as a result of, or in connection with, a tax change or regulatory change;
- WAGN incurs conforming capital expenditure or conforming operating expenditure as a result of, or in connection with, any law that:
  - establishes, changes or regulates the operation of, an emissions trading scheme or mechanism that has as one of its objectives the management or reduction of greenhouse gas emissions or concentrations and which includes the scheme set out in, or a scheme similar to, the scheme contemplated in the Carbon Pollution Reduction Scheme Bill 2009 (Cth) and its associated legislation and regulations, as promulgated, supplemented or amended from time to time;
  - imposes a fee, penalty or tax on greenhouse gas emissions or concentrations; or
  - establishes, changes or regulates the operation of, any renewable energy scheme, including the scheme under the Renewable Energy (Electricity) Act 2000 (Cth) and its associated legislation and regulations, as promulgated, supplemented or amended from time to time; and
- WAGN incurs conforming operating expenditure additional to the amount forecast for the purpose of determining total revenue for the current access arrangement period because there has been an unanticipated change in the price of gas required to replace unaccounted for gas.

11.3 Requirements of Rule 97(3)

Rule 97(3) requires that, when deciding whether a particular reference tariff variation mechanism is appropriate to a particular access arrangement, the ERA must have regard to:

- the need for efficient tariff structures; and
- the possible effects of the reference tariff variation mechanism on administrative costs of the ERA, the service provider, and users or potential users; and
- the regulatory arrangements (if any) applicable to the relevant reference services before the commencement of the proposed reference tariff variation mechanism; and

- the desirability of consistency between regulatory arrangements for similar services (both within and beyond the relevant jurisdiction).

The reference tariff variation mechanism of Annexure B does not change the structure of the tariffs for the reference services provided using the WAGN GDS. The structure of those tariffs is determined in accordance with the provisions of Rule 94, which require that consideration be given to economic efficiency.

The reference tariff variation mechanism does not substantially change the procedures previously followed by WAGN and by the Economic Regulation Authority in varying the reference tariffs for the WAGN GDS, and should not change the procedures followed by users and potential users in responding to tariff changes. The mechanism introduces a further step into the scheme of tariff variation which previously applied: variation of the reference tariffs at the commencement of a new access arrangement period to allow for inflation and for recovery of additional regulatory costs incurred in the last year of the previous access arrangement period. This should not significantly increase administrative costs. WAGN will incur the – relatively small – costs of determining and promulgating the change through issue of a variation report, and amendment of its tariff schedules, and the Economic Regulation Authority will have one further tariff variation to review. Because the tariff variation in question coincides with the reference tariffs for a new access arrangement period coming into effect, users are not expected to incur additional administrative costs.

The reference tariff variation mechanism of Annexure B does not change the form of the regulatory arrangements previously applicable to the reference services provided using the WAGN GDS. It only extends the operation of those arrangements to cover a number of gaps in their application.

In Western Australia, there is no other provider of services similar to the reference services provided by WAGN using the WAGN GDS. There is, therefore, no issue of consistency between the reference tariff variation mechanism and regulatory arrangements for similar services.

12 DELETED - CONFIDENTIAL

[Deleted – Confidential]