THE HYPOTHETICAL NEW ENTRANT TEST IN THE CONTEXT OF ASSESSING THE MOOMBA TO SYDNEY PIPELINE PRICES

A Report for the ACCC

Prepared by NERA

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EXECUTIVE SUMMARY

The Australian Competition and Consumer Commission (ACCC) has engaged NERA to critique a submission by the Network Economics Consulting Group (NECG) of 11 February 2002 to the National Competition Council (NCC). NECG's submission was made on behalf of East Australian Pipeline Limited and was in response to the NCC's draft recommendation on EAPL's application for revocation of coverage of parts of the Moomba to Sydney Pipeline System (MSP). We have also been asked to apply the hypothetical new entrant (HNE) test to the MSP and to compare HNE prices with those actually charged for use of the MSP.

In this context we have been asked to address the following four questions:

i. How should the prices that would be charged by a hypothetical new entrant be calculated in general and in the case of the MSP specifically?

ii. How do HNE prices compare with actual MSP prices?

iii. Is there an alternative test for whether or not current MSP prices are evidence of the exercise of market power?

iv. Which test is the best benchmark for the examination of MSP prices for the exercise of market power both in general and by the MSP in particular?

The Hypothetical New Entrant Test

We consider that the hypothetical new entrant test asks:

> *What is the maximum price an incumbent could charge if there was a credible threat of entry? In other words what is the maximum price consumers would be willing to pay an existing infrastructure owner if they had the hypothetical option to overcome transaction costs and negotiate as a coalition with a new entrant to provide substitute services?*

By assuming away the barriers to consumers acting as a unified coalition, the hypothetical new entrant test (hypothetically) removes the market power from the incumbent producers. It is therefore an attempt to derive a hypothetical 'competitive' market price for an industry that may not be competitive. When this is done in the case of the MSP we consider that the upper bound estimate of the hypothetical new entrant price would be given by dividing:

? The annual cost of a new pipeline from Moomba to Sydney given today's cost parameters; by

? the current ACT/NSW gas transportation quantities.

That is, we consider that the least cost method for supplying existing gas transport from the Cooper Basin to customers in the ACT/NSW would be based on a single pipeline serving

that market (and therefore maximising the capture of economies of scale). This is an upper bound since it is possible that a pipeline from an alternative gas basin would lower costs.

We calculate that actual prices charged for use of the MSP are at least 30 percent in excess of HNE prices. For the Moomba to Wilton service this translates to a HNE price of $0.51/GJ compared with the MSP's current price of $0.66/GJ.

Network Economics Consulting Group (NECG) have argued[1] that an alternative approach is appropriate whereby the volumes used to derive prices in the above calculation are the current volumes on the MSP – which are lower than they would have been in the absence of the construction of the Eastern Gas Pipeline (EGP). However, we believe that this aspect of NECG's analysis is flawed. The correct approach, which divides the cost of a new pipeline by current NSW/ACT demand for gas transportation, arises from the following logically compelling propositions.

? if NECG's methodology for calculating the hypothetical new entrant costs for the MSP is the correct methodology to apply today then it must also have been the correct methodology to have applied prior to the entry of the EGP;

? the entry of the EGP cannot by itself result in the hypothetical new entrant price rising ie, loss of sales to a new firm does not increase either the hypothetical entrant's costs or the resulting prices; and

? if current prices are higher than prices determined by the application of the NECG new entrant test *prior to* the introduction of the EGP then this is evidence of the exercise of market power, unless there have been cost and volume changes independent of the EGP's entry that fully explain those higher prices.

If this set of propositions is accepted then not only does it support our earlier conclusion (that MSP prices are in excess of HNE prices by at least 30 percent) but also provides an independent test for the exercise of market power by the MSP. Under this test we calculate that MSP prices prior to the entry of the EGP (of around $0.71/GJ for the Moomba–Wilton service) were at least 42 percent above hypothetical new entrant prices (of around $0.50/GJ). Since then MSP prices have fallen by around 7 percent to $0.66/GJ (on the Moomba – Wilton service) but remains over 30 percent above those hypothetical new entrant prices. This suggests that either:

? contrary to reasonable expectations, entry of the EGP somehow caused competitive prices to rise by around one third (from $0.50/GJ to $0.66/GJ); or

[1] Critique of the ACCC draft decision of MSP tariff in the context of the hypothetical new entrant price. Appendix to EAPL February submission to the NCC on its draft decision on MSP revocation.

? more reasonably, that MSP prices are still substantially above competitive levels (ie, the MSP is exercising market power).

We are unaware of any arguments that can convincingly explain why the entry of a new firm results in competitive benchmarks increasing. As a result, we consider that MSP prices are still substantially above competitive levels and this is evidence that the MSP is currently exercising market power.

The Regulatory Contract Approach

The hypothetical new entrant test considers a firm's prices in relation to 'competitive' prices *at a given point in time*. Under this test, the firm bears the risks associated with market and technological changes, which could lead to under or over recovery of sunk investments.

In contrast, the regulatory contract approach would consider the firm's ability to recover its reasonable costs *over the life of the asset*. Under this approach, the firm is protected against market and technological risks (positive or negative) associated with the hypothetical new entrant test. At any point in time, the appropriate price under a regulatory contract may be more or less than the hypothetical new entrant price, depending on the extent to which the firm has recovered its investment through past pricing decisions and changes in market conditions. Under the regulatory contract approach, in combination with our assumption that consumers can act as a unified coalition, the firm achieves normal profits over the life of the asset.[2] If a firm breaks the regulatory contract at some point in time (or the contract lapses for some period) and attempts to earn greater than normal prices it can be considered to be exploiting market power – even if this does not involve pricing above the hypothetical new entrant price.

Arguably, the Gas Code provides a regulatory contract under which future prices for gas transportation are to be set. The Gas Code may be a reflection and formal embodiment of implicit past regulatory contracts or it may be a new regulatory contract – brought into force by legislators. In any event, if the Gas Code is viewed as a regulatory contract and if the ACCC's draft decision applies the Gas Code correctly then current prices on the MSP exceed those that would apply under the regulatory contract by over 40 percent.

Which Test is Appropriate?

The most appropriate test to use will depend on whether a regulatory contract currently exists going forward or whether future prices are expected to be set in accordance with the hypothetical new entrant test (ie, at 'competitive' levels). This will in turn depend on whether there has been any recent explicit decision to apply a regulatory contract to the MSP

[2] 'Normal' profits refer to that level that is just sufficient to attract capital under the comparatively low risk regulatory contract model.

(arguably such as coverage under the Gas Code) or whether past determinants of pricing are suggestive of an implicit regulatory contract.

In any event, our analysis suggests that current prices on the MSP would fail conceivable applications of either the hypothetical new entrant test, the regulatory contract test or a third test based on NECG's analysis plus the proposition that competition does not cause the competitive price to rise.

1. INTRODUCTION AND BACKGROUND

The Australian Competition and Consumer Commission (ACCC) has engaged NERA to critique a submission by the Network Economics Consulting Group (NECG) of 11 February 2002 to the National Competition Council (NCC). NECG's submission was made on behalf of East Australian Pipeline Limited and was in response to the NCC's draft recommendation on EAPL's application for revocation of coverage of parts of the Moomba to Sydney Pipeline System (MSP). We have also been asked to apply a hypothetical new entrant (HNE) test to the MSP and to compare HNE prices with those actually charged for use of the MSP.

1.1. Background

East Australian Pipeline Limited (EAPL) is seeking revocation of the coverage of two pipelines within the Moomba to Sydney pipeline (MSP) system under the provisions of the New South Wales (NSW), South Australian, Queensland and Australian Capital Territory (ACT) gas pipeline access regimes.

The National Competition Commission (NCC) is considering whether to revoke coverage of the MSP under the Gas Act.[3] The National Competition Council (NCC), in December 2001, released a draft recommendation that coverage not be revoked. This recommendation was based in part on the Australian Competition and Consumer Commission (ACCC)'s views reflected in its *Draft Decision Access Arrangements by East Australian Pipeline Limited for Moomba to Sydney Pipeline System* (Draft Decision), which calculated prices for MSP services substantially below current prices on the MSP.

On 11 February 2002, EAPL responded to the NCC's draft determination. Appended to this response was Network Economic Consulting Group (NECG)'s paper *Critique of ACCC draft decision on MSP tariff in the context of the hypothetical new entrant price*. NECG's paper argued that the NCC's reliance on the ACCC's findings was inappropriate. This was based in part on the claim that the ACCC did not set out to calculate the contestable market price but rather to apply the National Third Party Access Code for National Pipeline Systems (the Gas Code), which is not necessarily consistent with the hypothetical new entrant test that NECG argued would be appropriate for the NCC's purposes.

The MSP is the only pipeline system currently delivering gas from the Cooper Basin production fields to markets in NSW and the ACT in southeast Australia. The MSP is owned by the East Australian Pipeline Limited (EAPL), which is a subsidiary of the Australian Pipeline Trust. The Australian Gas Light Company (AGL), the gas distribution

[3] Coverage of a pipeline under the *National Third Party Access Code for Natural Gas Pipeline Systems* imposes a regulatory regime that requires the pipeline operator to submit to the Australian Competition and Consumer Commission (ACCC) an arrangement for third party access, imposes disclosure requirements upon the pipeline operator, and puts in place an access dispute arbitration process. Hereafter, we refer to the Code and the other relevant legislation such as the *Gas Pipelines Access Law* and the *Natural Gas Pipelines Access Agreement 1997* collectively as the "Gas Act".

company in NSW, owns 30% of the Australian Pipeline Trust and is a major gas retailer in ACT and NSW. AGL's subsidiary, Agility Management Pty Limited, is the physical operator of the pipeline.

Prior to 1998, the MSP accounted for almost all of the natural gas delivered into the NSW and the ACT retail markets.[4] The MSP was subject to coverage under the Gas Act provisions, which impose third party access requirements. However, no access arrangements for the MSP are currently in place under the Gas Act provisions.

In 1998, the previous owners of the MSP and the owners of a spur from the Victorian pipeline system jointly constructed the Interconnect pipeline to link the Victorian pipeline system to the MSP, thereby introducing another possible source of natural gas transport into NSW and the ACT through the existing Victorian gas network (although that pipeline was not built to serve a particular firm demand for gas, either into Victoria from the north or into NSW from the south, and since its construction has served no major firm gas customers in either direction).[5] In 2000, the Eastern Gas Pipeline (EGP) began operation, providing a source of natural gas transport from the major production fields in the Gippsland Basin to the retail markets in NSW/ACT. The EGP is owned by Duke Eastern Gas Pipeline Pty Limited and DEI Eastern Gas Pipeline Pty Limited and is operated by Duke Australia Operations Pty Limited (collectively Duke).

In January 2000, AGL Energy Sales & Marketing Limited, a related body corporate of AGL, petitioned the National Competition Commission (NCC) to subject the EGP to access coverage.[6] On 3 July 2000, the NCC made a recommendation to the Minister for Industry, Science and Resources (the Minister) that the EGP should be covered and in October 2000 the Minister determined that the EGP should be covered.[7] Duke appealed the decision to the Australian Competition Tribunal (the Tribunal), which revoked coverage in May 2001.[8] This prompted EAPL to apply to the NCC to revoke coverage of the MSP, which initiated the current proceeding. Meanwhile, in December 2000, the ACCC issued a draft decision for access regulation of the MSP that called for prices that were approximately 40% below those rates proposed by EAPL.[9]

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[4] In 1997, 95% of the natural gas consumed in NSW was supplied via the MSP (see page 27 of *Final Recommendation: Application for Coverage of the Eastern Gas Pipeline (Longford to Sydney)*, National Competition Council, June 2000).

[5] The Interconnector ties the Victorian system to the MSP system. Thus, while it increased the numbers of sources available to inject gas in the MSP system, it did not increase the number of pipeline companies serving the NSW/ACT destination market.

[6] For a pipeline to be subject to access coverage the Minister must be satisfied that each of the four criteria set forth in Section 1.9 of the *National Third Party Access Code for Natural Gas Pipeline Systems* are satisfied. The relevant criteria are cited in Section II below of this memorandum.

[7] See *Decision on Coverage of Parts of the Moomba to Sydney Pipeline System by Minister Nick Minchin*, 16 October 2000.

[8] See *Duke Eastern Gas Pipeline Pty Ltd* [2001] ATPR 41-821.

[9] EAPL proposed $0.71/Gj (in line with its published tariff) while the ACCC proposed $0.43/Gj for the initial tariff of the access arrangement period for the Moomba to Sydney mainline. See *Draft Decision Access Arrangement by East*

1.2. Scope and Structure of Report

This report addresses four questions:

i. How should the prices that would be charged by a hypothetical new entrant be calculated in general and in the case of the MSP specifically?

ii. How do HNE prices compare with actual MSP prices?

iii. Is there an alternative test for whether or not current MSP prices are evidence of the exercise of market power?

iv. Which test is the best benchmark for the examination of MSP prices for the exercise of market power both in general and by the MSP in particular?

Given these questions, this report is structured as follows:

? section 2 discusses the objectives of and rationale behind the hypothetical new entrant test, and the conditions under which it is a suitable test for exercise of market power. In addition, section 2 examines issues of significant importance in the application of the test to the MSP, such as the appropriate volume of services the new entrant can be assumed to supply;

? section 3 examines NECG's analysis of the application of the hypothetical new entrant test to the MSP;

? section 4 examines an adaptation of NECG's analysis that provides a related test for the exercise of market power that can be applied in the specific circumstances of the MSP;

? section 5 provides an empirical estimate of the hypothetical new entrant test and the test outlined in section 4 as they relate to the MSP;

? section 6 considers the application of an alternative test for the exercise of market power. This is a test of whether current prices are consistent with any contract between pipeline and regulators/customers. We also discuss how this test may be applied in the case of the Moomba to Sydney pipeline;

? section 7 provides concluding comments.

Australian Pipeline Limited for the Moomba to Sydney Pipeline System, Australian Competition and Consumer Commission (ACCC), December 19, 2000. EAPL, however, reduced its then published tariff to $0.66 from 1 July 2000, but at that stage lodged no revisions to its proposed access arrangement to accommodate the lower tariff. In a revised access arrangement lodged with the ACCC in June 2002, EAPL is now proposing $0.66/GJ as the initial tariff for the access arrangement period.

2. HYPOTHETICAL NEW ENTRANT PRICES

2.1. Objective of the Hypothetical New Entrant Test

A hypothetical new entrant test assesses the price the incumbent firm is currently charging against the maximum price it could charge without encouraging entry into the market *if it were subject to the threat of competitive entry.* In the case of a business, such as a pipeline, that displays the scale-economy features of a natural monopoly, a hypothetical new entrant test presumes that customers can form a coalition to purchase services from the new entrant as a group.[10] That is, the hypothetical new entrant test asks "are prices at a level that would encourage new firms to enter the market if entry and exit were not restricted". If the answer to this question is "yes" this may suggest that the incumbent is exercising market power. The test can be thought of as estimating "competitive" price levels for non-competitive industries, ie, for industries which are not subject to credible threats of entry.

Whether it is an appropriate regulatory goal to ensure prices are no higher than these hypothetically competitive levels is a separate question. Attempting to set prices of natural monopolies in the same way as prices of competitive industries may or may not be an appropriate objective. The price volatility associated with cost recovery in competitive markets may not be appropriate for markets with very long lived, dedicated and immobile assets. In addition, there may be a significant information burden placed on those carrying out the hypothetical new entrant test. However, such issues are beyond the scope of this report.

In this section, we first consider the theory behind the test and the role of new entrants in setting prices in competitive markets. We then discuss the application of the test to non-competitive markets in general and the MSP in particular.

2.2. New Entrant's Role in Setting Prices in Competitive Markets

It is useful to define the role of new entrants in setting prices, in competitive markets before fully defining and applying the hypothetical new entrant test in non-competitive markets. In competitive industries the maximum price an incumbent firm can sustainably charge for a service is set by the minimum economic costs that the most efficient potential new entrant[11] would incur in providing a service of equivalent quality. If prices are set above that level then this will attract new entry until prices and new entrant costs are once again equated (either by price reductions due to increased supply or by an increase in new entrant cost as the most efficient potential entrants become incumbents). Similarly, if prices fall below new

[10] Without such an assumption, the presence of scale economies can, in and of themselves, be a barrier to new entry.

[11] The 'new entrant' may be an entirely new firm operating in that market or it may involve an expansion of capacity at another firm already operating in the market. In this context, new entrant refers to additional capacity entering the market – whether this is through an existing or new firm.

entrant costs then this will prevent entry to (or promote exit from) the market until demand and supply again equate prices with new entrant costs.

In such an industry, incumbent firms have no *ex post* protection from adverse changes in demand or cost conditions. To see this it is instructive to examine the impact on prices and profits of incumbent firms in the following three adverse market scenarios.

- *An incumbent incurs higher costs than a potential new entrant.*

  The incumbent will be unable to recover that portion of its costs that are above new entrant costs.

- *A new, cheaper production technology becomes available.*

  Incumbent firms will be forced by competition to price "as if" they had invested in that technology – even if they had actually invested in a more expensive technology.

- *Market entry outstrips demand growth causing market supply to exceed market demand at new entrant prices (for example, if new entrants inaccurately assess cost or demand conditions).*

  Prices will fall below the level required to allow new entrants to recover their costs. The market will only re-reach its long run equilibrium when demand growth or supply exit restores the balance of demand and supply at the new entrant price.

While a competitive market does not provide any *ex post* protection from these types of market developments, it does provide *ex ante* compensation for the probability that they may occur. For example, if all market participants consider that there is a risk that a new cheaper production process will become available then potential new entrants will be less willing to invest in existing technology to enter the market. That is, potential new entrants will include the risk that new investment costs may not be fully recovered in their calculation of the cost of entry. As a result, maximum market prices will reflect the recovery of current least cost technology plus compensation for the risk of asset stranding based on the market's estimate of the probability, timing and magnitude of any potential technological advances. A similar compensation (positive or negative) will be included in current market prices for the market's expectations of future changes in demand conditions.

2.2.1. Prices not revenue relevant to hypothetical new entrant test

It is important to note that it is prices, not revenues, which are subject to the hypothetical new entrant test. This is because in a competitive market potential new entrants compare market prices with their own expected *unit costs* when deciding on entry. They do not compare their expected *total costs* with the revenues of existing incumbents - since the scale of operations amongst firms need not be the same.

This is an important issue because simply comparing the total cost of a hypothetical new entrant with the total revenue of an incumbent may give a misleading picture if the hypothetical new entrant would efficiently operate at a higher scale (ie, greater utilisation). This issue has not been addressed in Network Economic Consulting Group (NECG)'s paper *Critique of ACCC draft decision on MSP tariff in the context of the hypothetical new entrant price*. In that paper NECG consistently refer to the hypothetical new entrant test as arriving at the contestable *market price*,[12] however, NECG's conclusions are based on a comparison of hypothetical new entrant *total costs* with the *revenues* of the incumbent MSP. This approach effectively assumes that the output of the hypothetical new entrant and the incumbent will be identical – which need not be the case.

As a result, NECG uses the costs of the hypothetical new entrant to set the revenues of the incumbent. This is only equivalent to setting the "*market price*" in the special case where the hypothetical new entrant operates on the same scale as the incumbent. That is, revenues and prices will only be the same if the hypothetical new entrant is restricted by assumption from capturing any economies of scale the incumbent firm(s) have not captured.

The following underlines this issue by highlighting that it is the potential new entrant's unit costs that set market prices and not the potential new entrant's total costs that set an incumbent's revenues.

Irrelevance of HNE Revenue

Let us assume that all incumbent firms in an industry have invested in a production technology that results in an efficient scale of operation being the production and sale of 100 units of output. That is, production at 100 units minimises the cost of production per unit (say, $1.0 per unit). This means that any production of more or less than 100 units will result in higher than minimum unit costs. In equilibrium these firms will produce and sell 100 units at $1.0 dollar each for revenue of $100.

Now imagine a new technology is developed such that efficient scale for that new technology is 200 units and the unit cost of production at that scale is $0.6. Operating at efficient scale using this technology a potential new entrant will have total costs of $120 (200*0.6) which is greater than the revenue currently being received by incumbent firms. However, the threat of entry (or actual entry) will cause prices to fall to $0.6 rather than rise to $1.2 (which would be required for incumbent revenues to equal the total cost of the potential new entrant).

This example should make clear that the hypothetical new entrant test sets market prices directly and not incumbent revenues. Incumbent revenues will be affected by hypothetical new entrant market prices but will not be set by them – incumbent revenues will also depend on the level of sales achieved by the incumbent(s).

[12] See section 6 "Consistent application of the hypothetical new entrant test" beginning on page 11.

2.3. Hypothetical New Entrant Prices in Non-Competitive Markets

In some market structures the threat of new entry is not credible and, as a result, incumbent firms have market power allowing them to set prices above the level associated with the least cost production technology. The threat of new entry will be reduced where:

? *Significant economies of scale exist relative to the size of the market – that is, the average cost curve is declining over a substantial proportion of the market.*[13]

Under these conditions, even if existing prices are such that the incumbents are making above normal profits, the entrant must consider the impact of market sharing on its ability to recover its costs. The lower an entrant's expected market share, the higher will be its unit costs. This implies that existing prices may not be sufficient to cover the costs of all firms servicing the market following entry, even if these prices provide the incumbents with above normal profits prior to entry.

? *Significant sunk costs of entry exist (meaning that investment in entry to the market cannot be recouped should the entrant decide to exit).*

In addition to the potential inability to capture sufficient economies of scale, the presence of sunk costs increases the magnitude of the costs that are at risk for the entrant.

? *Significant transaction costs exist amongst final consumers such that they are prevented from credibly threatening to form a coalition and bypass existing suppliers.*

The entry-deterring effects of economies of scale can be avoided if consumers are able to commit to provide an entrant with sufficient market share to ensure that entrant could provide services at a lower price than the incumbents, while still recovering all its costs. Customers' ability to do this will be reduced if there are significant transaction costs. These costs could relate, for instance, to negotiating costs, exit clauses within existing contracts, the ability to commit future users, etc.

An industry characterised by significant economies of scale is sometimes referred to as having "natural monopoly" characteristics. In such industries, it may not be possible to rely on the threat of entry to constrain prices. The purpose of the hypothetical new entrant test is to provide an estimate of the level of prices that would exist *if entry were a credible threat*. In this sense, the hypothetical new entrant test can be viewed as determining the long-run prices that would exist if the market were subject to competitive entry. We note that this is not necessarily the same as the prices that would exist in a competitive market in the short

term. As discussed above, prices in a competitive market may fall below (or rise above) new entrant levels for a period long enough to encourage entry (exit) into the market.

The hypothetical new entrant test asks:

> *"What is the maximum price an incumbent could charge if there was a credible threat of entry? In other words what is the maximum price consumers would be willing to pay an existing infrastructure owner if they had the hypothetical option to overcome transaction costs and negotiate as a coalition with a new entrant to provide substitute services?"*

By assuming away the barriers to consumers acting as a unified coalition[14] the hypothetical new entrant test (hypothetically) removes market power from incumbent producers. The hypothetical new entrant test, by definition, provides prices that reflect the long run equilibrium prices a competitive market would attain. That is, while a competitive market may set prices that deviate from new entrant costs in the short run (while entry or exit from the industry is occurring), the hypothetical new entrant test abstracts from the short run and calculates long run competitive price levels.

Non competitive markets may have one or more incumbent firms, however, the larger the number of incumbents the greater is the prima facie case that economies of scale not be significant relative to the size of the market, particularly if a number of incumbents serve a particular route in the type of spatially separated markets served by pipelines. That is, the larger the number of incumbents the greater is the presumption that the market is subject to the credible threat of entry.

The hypothetical new entrant test is the same whether there is one or several incumbents operating in the market. It simply asks what is the minimum price consumers could contract with a new entrant of efficient scale if there were no barriers to them doing so. If a new entrant could supply existing customers at a lower price than they are currently supplied, then this is the hypothetical new entrant price – irrespective of whether one or more than one incumbent firms currently service those customers. Similarly, where there are many incumbent firms the hypothetical new entrant test, properly applied, will give the same long run equilibrium price as would competitive forces.

2.3.1. Defining substitute services

The hypothetical new entrant test requires a concept of services that can substitute for those currently being provided. A narrow interpretation of this concept would be the identical services that are currently provided to existing customers. However, this definition is inappropriate since it could require the hypothetical new entrant to replicate aspects of the current services that are no longer (or never were) economically efficient.

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[14] In the context of a conventional analysis of the existence of market power, this is equivalent to hypothesising the existence of a perfect demand side substitute.

For example, in the market for delivered gas at a particular location it is likely that customers will regard delivered gas from any gas field as a near perfect substitute. If delivery from gas field A is the least cost method of providing this service it would be inappropriate to constrain the hypothetical new entrant test to calculating the least cost method of supplying gas from gas field B. In a competitive market, if an investment is made in an asset that is not least cost then the owners of that asset are forced to price their service in a manner that is competitive with that price a potential new entrant would charge when using the least cost technology. This is just another way of saying that competitive prices do not protect investments in assets that are not least cost in a forward looking sense.

Similarly, an existing gas pipeline system may have a lateral pipeline that previously serviced some residents in a small town and a gas turbine electricity generator. However, the gas turbine electricity generator may have closed making the servicing of the residential customers in that town by a hypothetical new entrant uneconomic. That is, the benefits to the residents (their willingness to pay) of the lateral would be less than the hypothetical costs of providing it. In this situation it would be least cost to provide those customers with sufficient monetary compensation for their (hypothetical) loss of gas supply than to extend the (hypothetical) new pipeline to them.

As such, the least cost provision of substitute services should include the possibility of providing substitutes other than connection to the gas pipeline system but which leave existing customers no worse off. This may be in the form of monetary compensation or, in the above example, could be in the form of the provision of bottled gas.

A coalition of all customers can always achieve agreement on such compensation if it is more efficient and if negotiation between customers is costless. This is because a more efficient bypass creates greater gains than losses. These gains can, by definition, always be transferred amongst a hypothetical coalition of customers to ensure that all customers are better off.

2.4. Applying the Hypothetical New Entrant Test to Prices on the MSP

2.4.1. Who are the customers?

The relevant set of consumers who would be provided with the hypothetical option of bypassing existing infrastructure owners are all those customers of delivered gas in the relevant market in which the hypothetical new entrant will enter. It is these consumers who would be asked the hypothetical question "what price would you be willing to pay for existing services if you were free to negotiate *en masse* for their provision by a new entrant?" In the context of the MSP the relevant set includes all consumers (potential and actual) of delivered gas in the NSW / ACT market currently served by the MSP.

For the hypothetical new entrant test it is only necessary to consider final consumers of delivered gas despite the fact that a gas pipeline provides a service to "upstream" gas

producers as well as the "downstream" purchasers of delivered gas. Gas producers require the pipeline in order to be able to sell their output to downstream customers, and final customers require the pipeline in order to be able to purchase gas from upstream producers. In general, the interests of upstream and downstream customers will be identical – to minimise the cost of transportation. However, in the context of the application of the hypothetical new entrant test, it is sufficient to treat final downstream consumers of delivered gas as the relevant customer group for the purposes of determining efficient bypass prices.[15] This is because upstream activities only have economic value to the extent that they serve final customers. Provided downstream customers are served in the most efficient (least cost) manner by a hypothetical new entrant, economic surplus is maximised and only issues concerning the distribution of this surplus amongst customers would remain.[16]

2.4.2. Where would the hypothetical new entrant pipeline be built?

For consumers of delivered gas in NSW/ACT the price of delivered gas includes both the well-head and transportation prices – that is, the service provided by a pipeline is part of a bundled good. These consumers would contract with the hypothetical new entrant pipeline capable of delivering the lowest cost delivered gas. Thus, it is possible that these consumers would contract with a hypothetical new entrant to provide pipeline infrastructure that is markedly different to the existing pipeline infrastructure.

However, it is not necessary to go to this level of complexity to compare hypothetical new entrant prices to those currently charged on the MSP – provided we are satisfied with calculating an upper bound estimate of new entrant prices. This is because, if the MSP is not the most efficient pipeline/gas field combination, then the MSP would have to charge at lower than the hypothetical new entrant price calculated 'as if' it were the most efficient pipeline/gas field combination. For this reason, unit costs calculated on the assumption that a pipeline from Moomba to NSW/ACT is the most efficient technology will provide an upper bound to the efficient hypothetical new entrant price estimate.

We note that it is perfectly possible that the least cost method for supplying gas to the ACT/NSW is not via a pipeline following the MSP's path. In particular we note that:

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[15] We note that this does not imply that a pipeline only has market power if it has market power in the downstream market. A pipeline may have no market power in this market but still may be able to price above economic costs and effectively capture economic rents from upstream producers of gas. Rather, this analysis suggests that in the context of the hypothetical new entrant test, it is sufficient to examine the least cost methodology of servicing final customers of delivered gas.

[16] In fact the theoretical exercise carried out assuming that upstream customers of the pipeline are included in the coalition will deliver precisely the same results as focusing only on downstream customers. This is because where the hypothetical least cost pipeline would connect existing upstream producers with downstream consumers their interests would be identical – to lower the unit costs of that pipeline. Where the least cost pipeline were to connect downstream consumers with a different set of upstream producers then, by definition, downstream consumers would be able to compensate existing upstream producers for any loss in rents (as the new pipeline would, by definition, create greater rents than are lost).

? the Gippsland basin is closer to the main gas loads in the ACT/NSW than is Moomba;

? the capital costs of the EGP are understood to be in the vicinity of $450m (or half the lowest estimated ORC available for the MSP);[17] and

? the EGP's entry (despite the existence of the MSP) suggests that the EGP is a lower cost pipeline/gas field combination (or longer-lived, reflecting larger Gippsland reserves) or that the EGP was built in an attempt to capture monopoly rents being charged to ACT/NSW gas consumers served by the MSP.[18]

With this in mind it is quite possible that the postulated upper bound, under the restriction that gas is to flow from the Cooper Basin, is considerably above the true hypothetical new entrant cost if that restriction were removed.

2.4.2.1. Consistency with 'point to point' service definition

There is no inconsistency with the adoption of a 'point to point' service definition[19] for existing pipelines and the fact that the hypothetical new entrant test allows for the possibility of re-optimisation of existing pipeline systems such that all existing 'points' need not be served by the hypothetical new entrant. It is clear that an existing gas pipeline carries gas from one point to another point (or set of points). It is therefore sensible when considering the market power of an existing pipeline to recognise that it may have market power at any of these 'points' – eg, in the market for delivery of gas *from* point A and in the market for delivery of gas *to* point B (or at any intermediate points).

The hypothetical new entrant test simply allows for the (theoretical) possibility that the manner in which all 'points' are currently served is not the most efficient/least cost. It does not mean that one can ignore the manner in which 'points' are actually connected when performing actual (as opposed to hypothetical) market analysis.

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[17] ACCC draft decision. This comparison of costs is only approximate as we note that the EGP is a smaller capacity pipeline than the MSP (both potential and actual) and the EGP could not serve a number of current MSP customers without the existence of the MSP (eg, those in Dubbo). However, the marginal cost of adding capacity at the time of construction are low relative to the total cost. That is, it is generally true that pipeline construction costs increase linearly in the diameter of the pipeline, while the capacity of larger lines increases exponentially. As such, a pipeline could be built by a hypothetical new entrant with double the capacity at much less than double the cost.

[18] As a practical matter, it is well known the at the time the MSP was built, there were institutional and political barriers to the interstate trade in gas—barriers that have largely been eradicated with the reform of the gas sectors generally in Australia. Thus, the recent construction of the EGP may also partly reflect a generally closer, larger and less expensive supply of gas to NSW.

[19] Refer to the Australian Competition Tribunal *Duke Eastern Gas Pipeline case*, 4 May 2001, in which the Tribunal found that the service provided by the EGP was the transportation of gas on a point-to-point basis. The Tribunal came to this conclusion when considering under section 1.9(b) of the Code whether it would be economic to develop another pipeline that provided the same services as the EGP.

2.4.3. What volumes would the hypothetical new entrant pipeline carry?

As discussed above, in the context of the application of the hypothetical new entrant pipeline the market is defined as the market for delivered gas in the ACT/NSW. In other words, final consumers of delivered gas in the ACT/NSW would choose the pipeline that minimises the unit cost of delivered gas to them. These customers are currently served by two major pipelines (the MSP and the EGP) that connect customers to two different gas fields. If this is the most efficient (least cost) pipeline network for delivering gas to final customers then the hypothetical new entrant test would replicate this network. That is, final customers would choose to contract with a new entrant (or two new entrants) that would build and operate two pipelines from different gas fields. The total costs of transportation charged to final customers would be based on the combined cost of the two pipelines (given current cost conditions).

However, if the current pipeline infrastructure is not the least cost network and if a single pipeline to one gas field would be more efficient, then final customers would bypass both existing pipelines by contracting with a single pipeline connecting customers with only one gas field. In this scenario a single hypothetical pipeline would supply the entire ACT/NSW market and its unit costs would be calculated on the basis of the cost of providing that volume of services. As discussed above, we do not need to know which gas field would be the most efficient supplier of gas to know that the unit costs of a pipeline that replicates the path of the MSP would be an upper bound for the prices the MSP could charge without attracting (hypothetical) bypass.

There are significant economies of scale in the gas pipeline industry. This reflects the fact that there are substantial fixed costs associated with constructing a pipeline (fixed in the sense that they do not vary with increasing capacity), such as the majority of design, surveying, site preparation and trenching costs. The cost of the pipeline itself also increases less than proportionately to increases in capacity. Increases in the volume of the pipeline increase the *diameter* less than proportionately and it is the diameter that is the main determinant of the cost.

This suggests that an appropriate *a priori* position is that a single pipeline is likely to be a lower cost way of providing transported gas to the NSW/ACT market than an infrastructure system comprising significant investment in more than one pipeline.[20] If this is the case, the new entrant price will reflect the cost of servicing the entire market from a single, efficiently built, pipeline. This price will depend on *total* market volumes, not the volume being

[20] There are other potential benefits of having more than one pipeline serving a distinct set of customers, such as diversity and improved security of supply. However, these benefits must be larger than the additional costs of constructing additional pipelines in order that their construction is least cost in an economic sense. These net benefits will tend to be largest when there is a relatively even geographical spread of population and gas fields – such as may be the case in Texas in the United States. This does not appear to be the case in South Eastern Australia with gas loads centred around the geographically distant Sydney and Melbourne and gas fields in the equally geographically distant Cooper Basin and Bass Straight.

serviced by any single existing pipeline that may be sharing market volumes with alternative pipelines. In this way, the level of existing industry capacity does not affect the hypothetical new entrant test.

Such treatment of pipelines and volumes under a hypothetical test is entirely appropriate, since the purpose of the new entrant test is to abstract from issues of *existing capacity* in order to consider what unit prices would be with *efficient capacity*. In other words, the hypothetical new entrant test states that if having two pipelines is less efficient than having one pipeline the total cost of transportation paid by final customers should not increase simply because investment in two pipelines has taken place.

Prior to the introduction of the EGP the hypothetical new entrant would have set the average annual price for transport on the MSP equal to the total annual cost of bypassing the MSP divided by total market volumes transported on the MSP. That is, prices would have been set according to the least cost method of supplying the market. The entry of the EGP would have resulted in no change in the hypothetical new entrant price (other than that induced by any increase in volumes occasioned by the new rival suppliers to the region). By definition, any loss of volume from the MSP to the EGP cannot result in an increase in the least cost method of servicing the market as the hypothetical least cost method of servicing the market is unchanged by actual investment in the market (such as the EGP). However, any attempt to calculate the hypothetical new entrant price by reference to the actual volumes of the MSP would see a rise in the hypothetical new entrant price as a result of the introduction of the EGP (and the consequent loss of market share from the MSP to the EGP).[21] This is not only counterintuitive but inconsistent with a fundamental tenet of economics – that the entry of a new firm does not cause competitive prices to rise.

It is instructive to examine what would happen in a competitive market if new entry occurred that resulted in incumbents losing market share (ie, the additional capacity created by entry could not be fully utilised given market demand at pre entry market prices). This increase in market capacity would cause all firms to lose economies of scale and experience an increase in average unit costs. However, this would cause market prices to *fall* rather than *rise* as firms would have a strong incentive to attempt to win back market share and regain economies of scale. Prices would only return to pre-entry levels once the entry had been reversed or market demand had grown sufficiently to absorb the new capacity.

The hypothetical new entrant test sets prices based on long run equilibrium unit costs and hence it does not deliver a price fall as a result of capacity entry that exceeds demand growth. Rather hypothetical new entrant prices remain constant. However, it is important to note that short run competitive pressures could cause prices to fall as incumbents' capacity utilisation falls due to 'competition'. This is in contrast to the estimated increase in

[21] We note that this refers to a rise in the hypothetical new entrant price on the MSP. The fact that actual prices on the MSP fell slightly after the introduction of the EGP is consistent with these prices being above hypothetical new entrant prices prior to the introduction of the EGP.

the hypothetical new entrant price that would result if actual volumes on the MSP were used to calculate hypothetical new entrant prices following the introduction of the EGP.

2.4.4. Efficient investment versus profitable investment

The previous section states that a reasonable *a priori* position is that a single gas pipeline serving the ACT/NSW market is likely to be the least cost way of serving final customers. This does not imply that the construction of the EGP pipeline, given the existence of the MSP, was uneconomic in a 'commercial' sense. Most likely, the construction of the EGP has largely been driven by competition for rents in the production of upstream gas. However, commercially profitable 'competition' for economic rents (rent seeking) does not imply that the associated investment is economically efficient from a society wide perspective.

By way of example, imagine a pipeline from gas field A to consumers of delivered gas at B is in existence and that this pipeline is of sufficient capacity to service the market for delivered gas at B for the foreseeable future. Imagine also that the economic cost of gas at production field A is substantially less than the price received for that gas by producers – that is, there are significant economic rents being earned by the gas producers on gas supplied from A to B.

Imagine further there is a second gas field at C where gas becomes available at a cost that is significantly less than the price of delivered gas at market B. If the gas cost difference is greater than the unit cost of constructing a new pipeline from C to B (given forecast of achievable sales in B) then it may be commercially profitable to construct a pipeline from C to B. Essentially, the economic rents available in market B may commercially justify the costs of attempting to capture those rents.

The attempt to capture these rents is primarily an attempt to transfer rents from producers at field A to producers at field C. A simple transfer of economic benefits does not create any net increase in economic benefits. However, costs incurred in chasing that transfer of rent (the building of the pipeline from C to B) result in a commensurate reduction in net economic benefits. Unless there are additional benefits[22] to society as a result of the construction of this pipeline then the pipeline will be inefficient (ie, not least cost) in an economic sense but may still be commercially successful.

[22] These benefits may occur if, in the process of seeking economic rents, competition between gas field C and gas field A results in a substantial reduction in the wellhead price of gas at A which flowed through into a reduction in the delivered price of gas from A to B. However, any tendency for transport costs on the A to B pipeline to rise as a result of this competition would tend to offset any gains in economic benefits. In addition, any such reduction in the delivered price of gas at B would have to create sufficient additional demand for gas (and associated additional consumer surplus) to exceed the cost of building the pipeline from C to B.

2.5. Conclusion

The following is a summary of important conclusions from the above analysis:

- the hypothetical new entrant test asks "w*hat is the maximum price customers would be willing to pay an existing infrastructure owner if they had the hypothetical option to overcome transaction costs and negotiate as a coalition with a new entrant to provide a substitute service?";*
- the relevant substitute service in the context of the application of the hypothetical new entrant test to the MSP is the delivery of gas to the ACT/NSW market by an alternative pipeline system. This does *not* imply that a 'point to point' service definition is inappropriate for the MSP. Rather, it simply reflects that the fact that, in the context of the hypothetical new entrant test, the economic least cost method of supplying a market must be defined in terms of the costs imposed on final consumers;
- the hypothetical new entrant price sets the *market price* not the *revenue* of individual incumbent pipelines;
- the hypothetical new entrant price is unaffected by the actual level and type of investment that has occurred in supplying customers;
- there is an *a priori* reasonable assumption that a single pipeline from a single gas field is the least cost way of servicing a given market;
- on this basis an upper bound for the hypothetical new entrant price for transport of gas on the MSP can be calculated with reference to the total cost of bypassing the MSP and NSW/ACT market volumes; and
- if it is assumed, alternatively, that the hypothetical new entrant would only carry incumbent firm specific volumes (rather than market volumes) then the hypothetical new entrant test would suggest that prices should rise in the advent of 'competition' and loss of market share by the incumbent firm—an irrational outcome of such competition.

3. EAPL/NECG'S APPROACH

In their response to the NCC's draft determination, EAPL has put forward analysis performed by NECG in the document "*Critique of the ACCC draft decision on MSP tariff in the context of the hypothetical new entrant price*". In this document NECG have implicitly argued that:

? the 'hypothetical new entrant test' is the appropriate method for determining whether prices reflect the exercise of market power; and

? the 'hypothetical new entrant test' takes a particular form – namely it is assumed that the test compares current revenues from an infrastructure asset with the revenues just sufficient to entice a hypothetical new entrant to provide the same services currently provided by that asset.

Our analysis identifies shortcomings in each of these points. The first is NECG's failure to recognise that there are other tests that may provide suitable assessments of whether a firm is exercising its market power. In particular, the regulatory contract approach attempts to assess whether a firm earns higher than normal profits over the life of the asset. This is in contrast to the hypothetical new entrant test, which assesses whether prices at a given point in time are higher than would be implied by competitive market conditions.

The second shortcoming is that NECG relied upon *firm revenue* characteristics in its new entrant test rather than on *market price* characteristics. Under a competitive market, all firms face a given price. The new entrant test should therefore be *price* rather than *revenue* based. It is the least cost way of supplying the market and the market volumes that are relevant for determining the new entrant price. NECG's approach clouds the distinction by taking the cost base from the hypothetical new entrant test while protecting the firm from loss of market share by applying firm specific volumes. This tends to result in higher calculated prices for MSP and is similar to the 'cherry picking' of concepts which NECG accuses the ACCC.[23]

It is useful to list the critical points in which NECG's analysis of the hypothetical new entrant test concords with our own analysis and to show why we consider that NECG's findings are inconsistent with these aspects of their analysis.

? *"Contestable **market prices** can be estimated by applying the hypothetical new entrant test"* Page 11 (emphasise added)

- We strongly agree with this statement and in particular with the emphasis we have added. However, the conclusions NECG reach are *not* based on the

[23] For example see NECG's paper "Critique of the ACCC draft decision on MSP tariff in the context of the hypothetical new entrant price", p 12.

setting of market prices but, rather, are based on setting the revenue of a single firm in the market. Unfortunately, NECG's analysis does not consider the possibility that:

a) there is more than one incumbent firm in the relevant market; or

b) the hypothetical new entrant would not serve the market via a pipeline from Moomba to Sydney.

? *"A hypothetical new entrant is not likely to inherit the baggage of an incumbent, whether the baggage is unfavourable (such as obsolete equipment, gold plated assets or outmoded work practices) or favourable (such as peculiarities in the tax position of an incumbent or below budget construction outcomes on some assets)."* Page 12

- We strongly agree with this statement and would add to the 'baggage' an hypothetical new entrant would not inherit 'poor capacity utilisation due to over investment in the relevant market'. For example, if two pipelines between Moomba and Sydney had been built side by side, resulting in poor capacity utilisation and high unit costs for both pipelines, an hypothetical new entrant would not inherit this 'baggage'. Similarly, if a pipeline from an alternative gas field had replicated some of the MSP's coverage and resulted in poor capacity utilisation on the MSP a hypothetical new entrant would not inherit this 'baggage'.

? "*Selectively adopting the best elements from each scenario (hypothetical versus actual) will not yield the contestable market price. If the hypothetical new entrant test is to be used effectively it must be used in its entirety.*" Page 12

- We strongly agree with this statement but note that by using actual volumes on the MSP to calculate hypothetical new entrant prices NECG has committed precisely this error.

? "*A hypothetical new entrant must, according to the thought experiment, construct an optimal new asset*". Page 13

- We strongly agree with this statement and note that an optimal new asset will be one that minimises the costs to final consumers of delivered gas. However, we note that such an asset need not connect Moomba to Sydney and assuming that it would without any further analysis only provides an upper bound of the hypothetical new entrant price.

The explicit (as opposed to implicit) statement by NECG that we most strongly disagree with is as follows.

? "*This test* [the hypothetical new entrant test] *asks what tariff level (or permitted revenue level) would just be sufficient to encourage an efficient hypothetical new firm to enter the market, assuming it could completely displace the incumbent service provider.*" Page 11

- This statement implies that there is a single incumbent service provider and that the test would compare that firm's revenue with that a hypothetical new entrant would require. This ignores the possibility that more than one incumbent may operate in the market. We have explained that the hypothetical new entrant test requires examination of the least cost method of servicing the market – the number of actual incumbents in that market is irrelevant.

4. AN ALTERNATIVE HYPOTHETICAL NEW ENTRANT TEST

Section 2 above provides analysis suggesting that an upper bound estimate of the hypothetical new entrant test would likely involve postulating that:

? the hypothetical new entrant would incur costs associated with building a pipeline from Moomba to Sydney; and

? the hypothetical new entrant would capture close to all current ACT/NSW demand for gas transportation (and hence would capture greater economies of scale than are currently captured by the MSP).

By contrast, NECG have argued for an alternative approach whereby the volumes used to derive prices are the current volumes on the MSP – which are lower than they would have been in the absence of the construction of the EGP. However, we believe this aspect of NECG's analysis is flawed. The correct approach, divides the annual cost of a new pipeline by current market demand for gas transportation.

We believe our analysis stands on its own. However, we note that there is an additional (and distinct) test that can be applied to the reasonableness of our analysis compared to NECG's. This relies only on the acceptance of the following logically compelling propositions:

? if NECG's methodology for calculating the hypothetical new entrant costs for the MSP is the correct methodology to apply today then it must also be the correct methodology to have applied prior to the entry of the EGP;

? the entry of the EGP as a 'competing' pipeline cannot by itself result in the hypothetical new entrant price rising, ie, competition does not cause the competitive price to rise; and

? if current prices are higher than prices determined by the application of the NECG new entrant test *prior to* the introduction of the EGP then this is evidence of the exercise of market power unless there have been cost and volume changes independent of the EGP's entry that fully explain those higher prices.

If this set of propositions is accepted then, not only does it support our earlier conclusions but it also provides an independent test of the exercise of market power by the MSP. The MSP can be found to be exercising market power provided that its post-EGP pricing is above the 'competitive benchmark' levels that existed prior to the entry of the EGP - unless changed cost or demand conditions can explain the difference independent of EGP's entry.

5. EMPIRICAL APPLICATION TO THE MSP

In this section we calculate actual hypothetical new entrant prices which can be compared with those currently charged by the MSP. In order to do this it is first necessary to calculate the annual cost a hypothetical new entrant would incur in serving the market and second to transform this cost into a price (or set of prices) per unit of output which can be meaningfully compared with that charged by the MSP. This is done in the following two sections.

5.1. Estimating the Annual Cost of a New Entrant

There are a number of parameters that will affect the cost of a hypothetical new entrant. In particular these are the cost of:

? financing the capital involved in the project;

? depreciation in the value of the capital invested; and

? ongoing operating and maintenance costs (including the cost of tax).

We use the parameters outlined in the following table that are discussed in the following sections.

Table 5.1
Hypothetical New Entrant Cost Parameters

Parameter	Value)	Source
Real Post Tax WACC	6.28%	Calculated from below
Real risk free rate	2.87%	RBA 40 day average of 5 year bond rate at 9 August '02
Market Risk Premium	6.00%	ACCC Draft Decision
E/V	40%	"
D/V	60%	"
Asset Beta	0.50	"
Equity beta	1.16	Calculated using Monkhouse levering formula
Debt beta	0.06	ACCC Draft Decision
Debt margin	1.20%	"
Real cost of debt	4.04%	Calculated from above
Real cost of equity	9.65%	Calculated from above
Cost of Tax		
Gamma	50%	ACCC Draft Decision
Corporate tax rate	30%	Legislative rate
Nominal risk free rate	5.62%	RBA 40 day average of 5 year bond rate at 9 August '02
Expected 5 year inflation rate	2.67%	Calculated from real and nominal risk free rates
Replacement cost and depreciation	(in July 2000 $m)	
Optimised replacement cost	$976.1m	ACCC Draft Decision and NERA analysis
Life of asset	80 years	EAPL
Rate at which replacement cost falls over time	0.5% per annum	NERA analysis
Operating and Maintenance Costs	$12.18m per annum	ACCC Draft Decision

5.1.1. The Initial Capital Outlay of a New Entrant

Were a new entrant to serve the existing NSW / ACT gas market it would have to first build an alternative pipeline. An upper bound estimate of the cost a new entrant would incur in doing this is the optimised replacement cost (ORC) *of the MSP*. The ORC of the MSP is the cost of a new entrant in replicating the services provided by the MSP in particular the provision of gas from Moomba to customers currently connected to the MSP. However, as noted in section 2.4.2 above this is an upper bound estimate of the costs of a new entrant in serving the NSW / ACT as it is possible that the MSP is not the most efficient pipeline / gas field combination to serve that market. In which case a hypothetical new entrant would not be constrained to replicate the MSP but could instead build a pipeline to an alternative gas field.

We note that it is possible that a hypothetical new entrant would supply gas to the NSW / ACT market via a pipeline from the Gippsland basin – following a similar path to the EGP. In this regard we note:

- the Gippsland basin is closer to the main gas loads in the NSW / ACT than is Moomba (besides representing potentially greater reserves);
- the capital costs of the EGP are understood to be in the vicinity of $450m (or half the lowest estimate available for the MSP);[24] and
- the EGP's entry (despite the fact that the MSP existed) suggests that either the EGP is a lower cost pipeline / gas field combination or that the EGP was built in an attempt to capture monopoly rents being charged to NSW / ACT gas consumers served by the MSP.

Nonetheless, in our analysis we have adopted the ORC associated with the replacement of the MSP as our estimate of the cost of a hypothetical new entrant in serving the NSW / ACT market. The estimate of the ORC for the MSP used in the ACCC's draft decision is $976.1m in July 2000 dollars. This is effectively equal to EAPL's estimate of the ORC less the removal of a 10 per cent contingency factor included in the EAPL estimate.

We understand that the use of contingency amounts in planning the construction of assets such as pipelines is common practice. In this situation the contingency does not reflect the expected cost of the pipeline but rather reflects an estimate of the highest cost that is likely to be incurred above the expected cost of the pipeline. By definition it is equally likely that costs will come in under the expected costs as it is likely that they will exceed expected costs.

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[24] ACCC draft decision. This comparison of costs is only rough as we note that the EGP is a smaller capacity pipeline than the MSP (both potential and actual) and the EGP could not serve a number of current MSP customers without the existence of the MSP (eg, those in Dubbo). However, the marginal cost of adding capacity at the time of construction are low relative to the total cost suggesting a pipeline could be built by a hypothetical new entrant with double the capacity at much less than double the cost.

However, it is sensible to plan for a contingency in which costs exceed expected costs in order to avoid the (potentially) costly requirement to negotiate further finance in the event of such cost overruns.

However, budget planning and market pricing are completely separate issues. If all firms in the economy priced as though their asset costs were 10% more expensive than in fact they were on average then there would be excessive profits being earned. This would in turn attract new entrants until prices were reduced to recover only the expected costs of a new entrant. It is for this reason that the appropriate ORC value to use in the context of applying the hypothetical new entrant test does not include such contingency costs.

5.1.2. Weighted Average Cost of Capital

The majority of a new entrant's costs in the years following entry will be the costs of financing the construction of the new pipeline system. These will in turn be determined by the risk adjusted rate of return demanded by the providers of capital used to finance the initial (and any later) capital investment. The magnitude of the risk adjusted rate of return is referred to as the weighted average cost of capital (WACC) – in practice most projects are financed by both equity and debt so the cost of capital is a weighted average of the cost of each funding source.

In our analysis we have used the capital asset pricing model (CAPM) in order to determine the WACC for a hypothetical new entrant. The CAPM estimates the cost of capital based on the riskiness of a particular asset relative to the market. The CAPM includes a number of parameters that are intended to reflect the riskiness of the individual asset / financing vehicle type (asset, equity and debt betas). All other things constant, the higher is the value of beta the higher is the riskiness of the underlying asset relative to the market – and the greater the compensation that those who finance the asset will demand. The other parameters in the CAPM (the risk free rate and the market risk premium) are intended to capture elements of the cost of capital that are determined independently of individual asset classes.

We have adopted the same CAPM parameters as adopted by the ACCC in its draft decision on the MSP[25] – with the exception of the observable risk free rates which we have updated based on more recent observations of yields on Commonwealth government bonds. Adopting the ACCC's assumptions and using latest observations of the risk free rate gives a

[25] We note that a great deal of debate is possible on each of these assumptions and that many economists and finance experts will hold reasonable and different views on each of them. This length of this report could easily be increased ten fold if we were to examine each of these views in detail. In order to avoid this and minimise the scope for controversy we have adopted the ACCC's WACC assumptions. However, we note that NERA has argued in a submission to the ACCC on behalf of Incitec that the equity beta for the MSP should be no more than 1. The ACCC draft decision adopted an equity beta of 1.16 which adds over 1 percentage point to the return on equity above that recommended by NERA in that report. (See Comments on East Australian Pipeline Limited Access Arrangements On Behalf of Incitec Ltd by Jeff D. Makholm, Ph.D. Senior Vice President)

real post tax WACC of 6.28 percent. Given an initial capital outlay of $976.1m this translates to a first year capital financing cost of $61.3m.

5.1.3. Economic Valuation of Assets

In addition to the cost of financing the initial capital outlay of building a new pipeline asset the hypothetical new entrant would also have to be compensated for any loss in value of that asset over time. As the hypothetical new entrant operates in a competitive market paradigm the depreciation in the value of its asset must also be calculated in a competitive market paradigm. In a competitive market the value of existing assets is determined by what a new entrant would be prepared to pay for those assets rather than purchase new assets today. This is in turn determined by the expected profile of future costs associated with its use.

The ACCC's Draft Statement of Regulatory Principles of Transmission Revenues[26] provides a formula to calculate the value of an existing asset on the assumption that there is a constant annual rate of technological change reducing the cost of replacement assets. That formula gives the following relationship:

$$A_t = A_1 \times (1 - p)^{t-1} \times (Z^L - Z^{t-1}) / (Z^L - 1) \qquad \text{Eqn 5.1}$$

Where:	A_t	the economic value of the asset in period t
	p	annual rate of decline in the cost of replacing the asset
	r	discount rate (WACC)
	Z	equals $(1 - r)/(1 - p)$
	L	the economic life of the asset
	t	the age of the existing asset

In terms of its economic interpretation this formula calculates the benefit a potential new entrant receives in terms of delaying new capital expenditure if they were to buy the existing asset rather than build a new asset today. This benefit has two components, first by delaying the time at which new construction costs must be incurred it reduces the present value of those costs. Secondly, to the extent that replacement costs are falling over time it reduces the real cost of construction when it is actually constructed (eg, future construction of a pipeline at the end of the existing pipeline's life will be cheaper than construction of a pipeline today).

However, it should be noted that the above formula also implicitly assumes the operating costs associated with an existing asset are the same as the operating costs associated with a new asset and this is true no matter what age difference exists between the assets. There are two reasons to consider that such an assumption is conservative. First, it is likely that the

[26] The ACCC's Draft Statement of Regulatory Principles of Transmission Revenues, p 66.

operating costs of a hypothetical new entrant would be lower than the operating costs of the MSP due to two factors. A new pipeline would be able to take advantage of technological advances that were unavailable at the time of the design and construction of the MSP in order to reduce operating costs. Second, operating costs of almost all assets increase as the age of the asset increases. As a result, we would expect a new asset to have lower operating costs than the MSP, which is 24 years old, currently does. In our analysis we have assumed that the operating costs of a hypothetical new entrant would be the same as for the MSP and, in this regard, our approach tends to estimate an upper bound for the hypothetical new entrant test.

5.1.4. New Entrant Depreciation (and the Rate of Technological Change)

The higher is the rate at which new pipeline construction costs are falling in cost the greater will be the depreciation in the value of the hypothetical new entrants assets – and the greater the costs of a hypothetical new entrant. For example, an increase in the assumed annual rate of technological change ('p') from 0.0 percent to 1.0 percent increases economic depreciation from less than $1m to $10m in the first year of an asset's life (assuming an economic life of 80 years, a WACC of 6.28 percent and a year one construction cost of $976.1m).

5.1.4.1. NECG's estimate of the value of 'p'

A submission by NECG on behalf of EAPL estimates the value of 'p' to be between 1 and 2 percent per annum. The reasoning behind this is set out in the following quote.

> *"As built at the time, the MSP had a 60 year engineering life. Using present construction materials, technology, and methods an equivalent pipeline can be built for similar cost but providing an 80 year engineering life. In crude terms this is equivalent to 33% more service potential over a sufficiently long time horizon for a nearly equivalent cost. Looking at this at the level of very broad approximation, this could be interpreted as a 33% improvement in output over the 24 year period since the MSP was built. This is consistent with a 1 – 2% per annum average rate of productivity improvement."*[27]

However, the conclusion NECG draws from its evidence is wrong. If the initial construction cost of an asset is unchanging over time, a 1-2 percent increase in the life of replacement assets *is not* equivalent to a 1-2 percent reduction in the cost of replacement assets. Rather, what is relevant to the application of a hypothetical new entrant test is the rate at which the cost of capital expenditure by new entrants is falling over time. A one year longer asset life provides a benefit to a hypothetical new entrant by virtue of the fact that they are able to delay replacement of that asset by one year (many years into the future). The value of this

[27] Appendix B to EAPL's 11 February 2002 submission to the NCC. "Response to National Competition Council Draft Recommendation on Application for Revocation of Coverage of the Moomba-Sydney Pipeline and Canberra Lateral, p 3.

distant benefit must be discounted by the time value of money—and hence is much less than the percentage change in asset life.

If NECG is right that initial construction costs are unchanging but that the life of replacement assets is increasing annually by 1.2 percent[28] then the NPV of capital expenditure costs for a hypothetical new entrant are falling by less than 0.05 percent per annum (assuming a real discount rate of 6.3 percent). That is, the value of delaying expenditure on a replacement pipeline from 80 to 81 years (approximately 1.2 percent increase in asset life) is less than 0.05 percent (ie, one twentieth of one percent) of the current construction costs. This is far from 1.00 to 2.00 percent per annum reductions in replacement costs.

5.1.4.2. Historical estimates of the value of 'p'

For the purposes of the hypothetical new entrant test it is the rate at which the costs of pipeline construction can be expected to fall in the future which is important for determining the economic depreciation of the new entrant's assets. However, it is likely that the best indicator of technological change in the future is the rate of technological change in the recent past.

In this regard we have derived estimates of the historical rate of productivity change (p) by calculating the value of 'p' that sets:

- the rolled forward value of historical capital expenditure on the MSP pipelines (adjusted for inflation); equal to
- current estimates of the ORC of the MSP pipelines

The results of this analysis are presented in the table below. More details on are provided in Appendix A.

[28] A 1.2 percent per annum increase in replacement asset's life over 24 years gives a 33 percent increase over 24 years – which is the proportionate increase in asset life assumed for the MSP by NECG.

Table 5.2
Historical Rates of Technological Change

Pipeline*	Junee to Griffith	Young to Lithgow	Dalton to Canberra	Young to Wagga	Moomba to Wilton	Average weighted	Average unweighted
Annual reduction in replacement costs (p)[1]	-4.06%	-0.55%	0.64%	1.31%	0.46%	0.46%	-0.63%
Age (years)	12	12	18	18	23		
Annual reduction in replacement costs (p)[2]						0.07%	

* Data on the historical construction cost of the Wagga to Culcairn pipeline and the Young to Lithgow compressor are not available so this has been excluded from our analysis.

[1] Using the ACCC ORC valuations.

[2] Using the EAPL ORC valuation after deducting the ACCC ORC values for the Wagga to Culcairn pipeline and the Young to Lithgow compressor.

From this table it can be seen that using the ACCC's values for ORC the estimates of rates of reduction in replacement costs vary between negative 4.1 percent (suggesting replacement costs are rising 4.1 percent per annum) and positive 1.3 percent. For the total system weighted by the replacement cost of each pipeline the average is 0.46 percent that is also equal to estimated rate for the Moomba to Wilton pipeline (this is not surprising as the Moomba to Wilton pipeline accounts for 84 percent of the replacement cost of the entire pipeline). However, the unweighted average is a value of negative 0.63 percent. This unweighted average is influenced by the inclusion of a large negative value for the Junee to Griffith pipeline. While we have no reason to consider this observation less reliable than any other, excluding the Junee to Griffith pipeline gives an unweighted average of 0.16 percent. Excluding both the Junee to Griffith and the Young to Wagga pipeline (the pipeline with the other extreme observation) gives an unweighted average of negative 0.22 percent.

It is also relevant to note that the two most recently built pipelines both have the greatest negative productivity growth estimates associated with them. Given that we are interested in forecasting future rates of change in productivity estimates it is arguable that the most recent historical observations should be given the most weight. In light of all these issues we consider that it is probably most reasonable to adopt an assumption of zero productivity growth when calculating competitive market depreciation costs for the hypothetical new entrant. This is consistent with the use of the data provided by NECG discussed above (when properly interpreted).

Nonetheless, for the sake of conservatism we have adopted an assumption of 0.5 percent per annum in order to be consistent with our other assumptions – which are predicated on estimating an upper bound estimate of hypothetical new entrant costs. This assumption is greater than the weighted average of all pipelines. This result is also conservative as it allows for the possibility that observations on smaller pipelines may be biased estimates of productivity growth on larger pipelines (such as the Moomba to Wilton pipeline which accounts for the majority of MSP costs).

When this assumption of a 0.5 percent fall in replacement cost is used then the estimated cost of economic depreciation for a hypothetical new entrant in the first year of operation is $5.2m.[29] This compares to a value of $0.5m if an assumption of 0 percent productivity growth is used.

5.1.5. Non Capital Costs

In addition to the capital costs discussed above (capital financing and capital depreciation) a hypothetical new entrant will also incur operating and maintenance and taxation costs. These are discussed below.

5.1.5.1. Operating and Maintenance Costs

Operating and maintenance costs are those costs incurred in the delivery of a service in a particular year that do not contribute to the delivery of that service in future years (ie, that are not capitalised into the value of the underlying asset). We have assumed that a hypothetical new entrant would have the same costs as the MSP currently incurs. As discussed above this is likely to be a conservative assumption because a hypothetical new entrant would likely have lower operating and maintenance costs due to:

- technological change in the design and construction of pipelines since the MSP was built that minimises operating and maintenance costs; and
- the relative age of a new entrant asset compared to the MSP.[30]

The ACCC Draft Decision essentially adopts EAPL's estimates of operating and maintenance cost[31] which were themselves based on EAPL's actual operating and maintenance costs. We have also adopted this value of $12.2m in July 2000 dollars.

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[29] Calculated on the basis of the other assumptions outlined in table 5.1

[30] However, we should note that any inherent conservatism associated with the second dot point will be partially offset by a higher rate of economic depreciation. That is, if the costs of operating and maintenance rise with the age of an asset this will mean that the market value of that asset will fall faster than would otherwise be the case. This in turn would mean that economic depreciation would be higher than would otherwise be the case. Nonetheless, at any reasonable assumption for the annual rate at which O&M costs increase with asset age (less than 5.5 percent per annum) the depreciation in the value of a new entrant's asset in the first year of its operation due to rising future O&M costs would be less than the savings in actual O&M costs relative to the (24 year old) MSP.

[31] We note that EAPL has since provided the ACCC with higher estimates of O&M costs (around 80% higher) but little in the way of firm explanation of these changes. In the absence of such explanation we consider it is prudent to continue to rely on EAPL's original estimates. Had we adopted this assumption then or finding that current MSP prices are significantly in excess of the HNE prices would not have been altered.

5.1.5.2. Tax costs

Our above estimates of capital financing costs are based on the post tax return that a hypothetical new entrant would require. However, income also attracts tax through the company tax regime, the cost of which will depend on:

? nominal income (which is itself a function of the inflation rate and the compensation for the above real costs, plus any compensation for the cost of tax itself);

? the level and timing of tax deductions under corporate tax law;

? the corporate tax rate; and

? the value to shareholders of any imputation credits associated corporate tax liabilities.

When all of these factors are taken into account in conjunction with the assumptions outlined in Table 5.1 above then a hypothetical new entrant has a negative cost of tax in the first year of operation of over $4m and this cost continues to be negative for several years thereafter. The reason for this negative cost of tax is that pipeline assets are depreciated for tax purposes over 20 years despite the fact that their economic life is around 80 years. This means that in the first 20 years of operation the cost of tax is significantly lower than it would be if tax depreciation was based on economic life. However, thereafter the annual cost of tax is significantly higher as tax depreciation has been fully exhausted.

It would be inappropriate to use a negative cost of tax in the first year of an hypothetical new entrant's operations when calculating hypothetical new entrant prices. This is because a competitive market would result in prices that allowed the cost of tax to be recovered over the life of an asset rather than in any given year. Indeed, given that at any one time there will be a number of firms with different asset ages operating in a competitive market then it is not possible to have a single competitive price which allows each firm to recover the cost of tax to it in that year where that cost of tax is dependent on the asset's age. Rather, the market will set a price based on the recovery of the net present value of tax costs over the life of an asset.[32]

In order to capture this we have calculated the annuity value of compensation for the cost of tax over the life of a hypothetical new entrant's asset and have included this in the calculation of the cost of a hypothetical new entrant in the first year of its operation. We

[32] More specifically, over the life of a new entrant's asset (to the extent that this may be different to that of incumbents).

calculate[33] this annuity value to be equal to $1.4m per annum that is consistent with a total NPV of compensation for tax equal to $18.2m.

5.1.6. Total Cost of an Hypothetical New Entrant

The above results are summarised in the following table where we calculate the upper bound estimate of the hypothetical new entrant cost to be $80.1m.

Table 5.3
Hypothetical New Entrant Costs

Cost Element	Value (June 2000 dollars)
Post tax return on capital	61.3
Depreciation	5.2
Operating and maintenance	12.2
Tax	1.4
Total	**80.1**

5.2. Estimating the Price of a Hypothetical new Entrant

As discussed in section 2.2.1, in a competitive market the hypothetical new entrant sets the market price incumbents receive, not the revenue that they receive. In order to transform the costs of a hypothetical new entrant (as set out above) into prices it is necessary to determine what volume of gas a hypothetical new entrant would transport. As outlined in section 2.4.3 we consider that the appropriate *a priori* assumption is that a single pipeline serving the NSW/ACT market will minimise the costs associated with serving that market, and therefore customers in that market would, given the opportunity, contract with a single (hypothetical) new entrant to supply their gas transportation needs. This means that the price a hypothetical new entrant would need to charge to recover its costs would depend on the entire NSW/ACT market for gas.

The purpose of applying the hypothetical new entrant test is to make a comparison with prices currently (and previously) charged for use of the MSP. To the extent that hypothetical new entrant prices are less than actual prices then this is deemed under that test evidence of the exercise of market power by the MSP over those periods. We calculate the relative average price for a hypothetical new entrant compared with the MSP as the ratio of the two prices, where the hypothetical new entrant price (P_{HNE}) is the ratio of its costs divided by

[33] The assumed inflation rate used is 2.67 percent per annum. The assumed inflation rate impacts on the cost of tax in two offsetting ways. Higher inflation tends to reduce the real cost of tax due to the debt shield provided by nominal deductibility of interest costs for tax purposes. However, higher inflation also tends to increase the real cost of tax due to the fact that only depreciation of the historical asset base is deductible for tax purposes. In the current circumstances these effects almost exactly offset with no significant sensitivity of the results to increased assumed inflation rates (eg, an increase to an assumed inflation rate of 4 percent increases annuity compensation for tax by less than $0.2m).

total market volumes (V_{MKT}) and MSP's price (P_{MSP}) is the ratio of its total revenues and its volumes (V_{MSP}). The ratios of those two prices can be expressed as follows:

$$\frac{P_{HNE}}{P_{MSP}} = \frac{HNE\ total\ costs}{MSP\ total\ revenue\ (associated\ with\ P_{MSP})} * \frac{V_{MSP}}{V_{MKT}} \qquad \text{Eqn 5.2}$$

In other words, if the annual cost of a hypothetical new entrant (HNE) were equal to half the revenue MSP achieves at its current prices and if volumes transported were the same then the hypothetical new entrant would charge half of MSP's current prices. Similarly, if costs and revenues were the same but an hypothetical new entrant would transport twice the volumes as the MSP then hypothetical new entrant prices would be half those currently charged on the MSP. Finally, if MSP transports half the volumes at half the total costs of the hypothetical new entrant, then the prices are the same (and the ratio above is 1.0).

In order to put the above equation into practice it is necessary to know the ratio of HNE costs to MSP revenues and the ratio of MSP volumes to total market volumes in each relevant period. These we summarise in the following table.

Table 5.4
Cost, Revenue ($ July 2000) and Volume Figures

	1999	2001	2002
MSP volumes*	117.7	99.4	89.8
HNE volumes	117.7	116.1	114.8
MSP volumes/HNE volumes	**100%**	**86%**	**78%**
Hypothetical new entrant costs (upper bound)	80.1	80.1	80.1
MSP revenues	113.6**	88.9	81.2
HNE costs/MSP Revenues	**71%**	**90%**	**99%**

* These are volumes for the entire pipeline system. To the extent that the entry of the EGP has meant that average distances transported are now lower then our analysis is conservative.

** Calculated as 2001 revenues multiplied by the 1999 to 2001 ratio of Moomba-Wilton tariffs and the ratio of MSP volumes.

MSP volumes are taken from the NCC Draft Recommendation "*Application for revocation of coverage of parts of the Moomba to Sydney pipeline system*" page 48. The hypothetical new entrant volumes are calculated as MSP volumes plus volumes estimated to be carried by the EGP. The NCC estimates that in 2002 the EGP was supplying 25 PJ per annum into the Sydney region[34]. An efficient hypothetical new entrant would minimise unit costs and maximise economies of scale by carrying current EAPL volumes plus this additional 25 PJ/annum. The MSP and EGP volume figures for 2001 are affected by the completion of the EGP in August 2000 meaning it was only operational for 10 out of 12 months in 2001. In order to be conservative we assume the EGP was only operational for 8 months of 2001 and then only at an annual rate of 20 PJ/annum (which is equal to estimates of volumes

[34] NCC Draft Recommendation *"Application for revocation of coverage of parts of the Moomba to Sydney pipeline system"*, p 52.

demanded by EGP's foundation customers). This gives a 2001 figure of 13.3 PJ supplied by EGP. Adding this to EAPL's forecasts of its own volumes in 2001 (of 99.4 PJ) gives a total market volume of 116.1 PJ. In 1999 the EGP was not yet built and, as a result, MSP and market volumes are assumed to be equal.

MSP revenue figures in 2001 and 2002 are based on forecast revenues taken from EAPL's access arrangement information and scaled down by 7 percent to account for the fact that EAPL's actual reference tariffs are approximately 7 percent lower than those set out in EAPL's access arrangement information. This is based on tariff for the Moomba to Wilton service that is $0.66/GJ rather than $0.71/GJ. It is only strictly true that this results in a 7 percent reduction in forecast revenues to the extent that all other prices are also 7 percent lower than as set out in the access arrangement information. For this reason we consider our approach to estimating MSP revenues in 2001 and 2002 is conservative. MSP revenue figures for 1999 are estimated as 2001 revenue scaled up for the higher 1999 reference tariff for Moomba to Wilton ($0.71/GJ instead of $0.66/GJ) and scaled up for the higher volume transported on the MSP.

Using equation 5.2 and the information contained in equation table 5.4 it is possible to estimate MSP average prices as a percentage of the hypothetical new entrant average prices in 1999, 2001 and 2002. These are set out in table 5.5 below.

Table 5.5
Hypothetical New Entrant Prices

	1999	2001	2002
Excess of MSP prices over HNE prices	41.8%	29.5%	29.6%

[1] Calculated as $P_{MSP}/P_{HNE} - 1$ (as per equation 5.2)

Applying this difference in the average HNE and MSP prices to the price for the Moomba to Wilton service allows for the following comparison in prices.

Table 5.6
Moomba to Wilton Price Differences

	1999	2001	2002
MSP price for Moomba to Wilton service ($/GJ)	0.71	0.66	0.66
HNE price for equivalent service ($/GJ)	0.50	0.51	0.51

The HNE price is slightly lower in 1999 than in 2001 and 2002 due to slightly higher volumes in that period. We note that we have not assumed that there would be any demand response to a reduction in prices to HNE levels. This makes our analysis particularly

conservative as one would expect such a price reduction to cause a demand increase and, consequently, further reductions in unit costs as pipeline capacity utilisation increases.

5.3. Interpretation and Conclusions

The foregoing analysis and the results reported in table 5.5 suggest that in each of the last two years the MSP has been charging tariffs around 30 percent above an upper bound estimate of the hypothetical new entrant tariffs. This is evidence of the exercise of market power by the MSP. The reason MSP prices exceed new entrant prices by more than revenues is that the entry of the EGP in financial year 2001 has resulted in a loss of market share to the MSP and reduced MSP revenues towards new entrant levels but not prices received by consumers.

Our conclusion that current prices are evidence of exercise of market power is further buttressed by an application of the hypothetical new entrant test to the MSP prior to the entry of the EGP. Applying the hypothetical new entrant test prior to the EGP does not require one to accept the proposition that a hypothetical new entrant would carry entire market volumes because prior to the entry of the EGP market volumes and MSP volumes were identical (or very close to it).

Under this test we calculate that MSP prices prior to the entry of the EGP (of around $0.71/GJ for the Moomba–Wilton service) were at least 42 percent above hypothetical new entrant prices (of around $0.50/GJ). Since then MSP prices have fallen by around 7 percent to $0.66/GJ (on the Moomba – Wilton service) but remains over 30 percent above those hypothetical new entrant prices. This suggests that either:

? contrary to reasonable expectations, entry of the EGP somehow caused competitive prices to rise by around one third (from $0.50/GJ to $0.66/GJ); or

? more reasonably, that MSP prices are still substantially above competitive levels (ie, the MSP is exercising market power).

We are unaware of any arguments that can convincingly explain why the entry of a new firm results in competitive benchmarks increasing. As a result, we consider that MSP prices are still substantially above competitive levels and this is evidence that the MSP is currently exercising market power.

6. THE REGULATORY CONTRACT APPROACH

6.1. The Regulatory Contract Test

The objective of the hypothetical new entrant test is to assess whether current prices are higher or lower than would be expected if entry into the market were a credible threat. Under this test, past prices, revenues and costs are irrelevant to the determination of current prices. In this way, the hypothetical new entrant test provides a static assessment of whether a firm could be said to be abusing its market power *at a particular point in time*. However, it may be appropriate to consider whether the firm has exercised its market power *over the life of the asset.*

This will tend to be the case if past prices / revenues have been set on the basis of an explicit or implicit contract between owners and customers (or with regulators on behalf of customers) and that contract required future revenues or prices to have regard to past prices / revenues and costs. The distinction between the application of the hypothetical new entrant test and a test based on the existence of a regulatory contract is best understood by reference to an example from a competitive industry.

In a competitive industry firms have a choice of selling their output on the market at the market price (the 'spot' price) which, in the long run, is determined by new entrant costs. Alternatively, they have the choice of contracting with a purchaser to sell future output at a pre-agreed price – irrespective of the spot price in the future. Firms in a competitive industry may wish to enter into this type of contract to reduce the risk that falls in the spot market price result in an inability to recover sunk investment costs. Similarly, purchasers may wish to enter into such contracts in order to remove the risk to them of spot market prices rising above expected levels.

Consider the case where a new firm enters the competitive industry and, at the same time, enters into a long term contract with a customer to sell all their future output at a pre-arranged price (or according to a pre-arranged formula for setting prices) which ensures the recovery of all the firm's sunk investment costs. It is possible that shortly after entering into this contract the market spot price (determined by new entrant costs) falls below the price set out in the contract. In this circumstance it is not reasonable to regard this firm as exercising market power even though it is pricing above new entrant costs.

It is also possible that after many years of recovering costs above new entrant costs the price set out in the contract falls below new entrant costs (spot prices) - either because this was an intended consequence of the contract or because new entrant costs unexpectedly rose above the contract price. In this situation if the firm were to increase its price above the contract price (ignoring the legal difficulties it may face in doing this) it could reasonably be considered to be exercising market power. This is true even if, in so doing, the firm did not increase its price above new entrant costs.

With this hypothetical example from a competitive market in mind it is possible to return to the examination of a natural monopoly industry. In a natural monopoly industry there will very often exist explicit or implicit contracts between firms and customers / regulators that provide a level of certainty to the firm that they will be able to recover their initial investment costs. The reason such agreements are common is due in part to the fact that natural monopoly industries, by definition, tend to require significant investment in long lived sunk assets.

Customers (or regulators on their behalf) may well be willing to enter into agreements with investors that provide a high level of certainty that, over the life of the asset, the investment owner will be able to recover the costs of the asset. One way of providing this certainty may be to 'front load' the recovery of investment costs on the basis that in later years cost recovery will be commensurately lower – with cost recovery over the life of the asset equal to actual costs incurred. If this is the case then it is likely that cost recovery in the early years of an asset's life will be above hypothetical new entrant costs and cost recovery in later years will be below hypothetical new entrant costs. There may also be circumstances where the converse applies, ie, if customers and investors arrange to 'back load' the recovery of costs, eg, where market demand is expected to grow significantly over the life of an asset.

This does not mean that an investor is exploiting market power in the early years even if it is pricing above hypothetical new entrant costs. Similarly, the fact that an investor may be pricing below hypothetical new entrant costs in the later years of the assets life is not proof that it is not exploiting market power. The correct test in the later years of the asset's life is "are prices above the level dictated by any relevant contract with customers / regulators".

The *regulatory contract* approach to testing for market power will be most appropriate when:

? the asset is part way through its useful life and:

  - past prices and revenues have been set under an implicit / explicit regulatory contract; or
  - a regulatory contract has recently been imposed after past above cost (monopoly) pricing of the asset;

? these regulatory arrangements have as an objective the provision of certainty of recovery of reasonable sunk costs over the life of the asset; and

? there has been an expectation that prices would continue to be set into the future under that regulatory framework arrangement.

6.2. Comparison of the Regulatory Contract and New Entrant Tests

The hypothetical new entrant test effectively gives consumers the benefit of technological advances and places the risk of these on the pipeline owner.[35] However, a natural monopoly is by definition not subject to competitive pressures. In recognition of this, consumers (or regulators on behalf of consumers) may choose to remove the uncertainty associated with the application of a hypothetical new entrant test, and remove the need to calculate and pay compensation to pipeline owners for anticipated technological change, by entering into a long-term contract or contract with infrastructure owners.

Unlike the hypothetical new entrant test, a long term contract provides asset owners with greater certainty over the recovery of their sunk costs in return for a commitment not to recover more than those costs. The regulatory contract approach effectively starts at a point in time and may limit the risk of stranding the pipeline owner is subject to from such things as:

? technological changes;

? changes in market demand; and

? changes to market share as a result of entry.

6.3. Applying the Regulatory Contract to the MSP

The first issue that must be addressed is whether a regulatory contract (either explicit or implicit) can be said to currently exist between the owners of the MSP and customers / regulators. In this regard it is pertinent to note that:

? the MSP was originally owned by the Commonwealth Government on behalf of citizens (including consumers of gas transportation services);

? in February 1994 the Council of Australian Governments agreed to put in place a uniform national framework for access to natural gas pipelines both within and between jurisdictions (the Gas Code);

? in the same year the MSP was sold by the Commonwealth under the *Moomba-Sydney Pipeline System Sale Act 1994*. The Act gave the ACCC responsibility for monitoring prices charged for use of the pipeline and the power to arbitrate access disputes including in relation to usage charges; and

[35] Technological change in this context is not limited to pipeline construction costs but also includes such advances as the discovery of gas at a site closer to consumers – such that the least cost technology for delivering gas to consumers is from that closer location.

? the ACCC's price monitoring role on the MSP was replaced by the ACCC's role under the Gas Code (the implementation of which was announced by COAG in 1997).

It appears reasonable to believe that the regulatory frameworks governing the past pricing of the MSP have had significant regard to providing owners of the MSP with certainty over the recovery of the sunk costs in exchange for a commitment that customers would not pay significantly more than the actual costs of the pipeline over its life. In particular, the Gas Code appears to have precisely these considerations in mind to the extent that it allows past cost recovery to impact on future prices. The ACCC's use of firm specific volumes to protect the owners of the MSP from financial losses due to loss of volumes to the EGP is also consistent with the interpretation of the Gas Code as a regulatory contract.

That is, the Gas Code appears to set out a regulatory contract between the owners of the MSP and its customers. In particular, by allowing past over recovery of costs to be offset against future revenues the Gas Code takes into consideration the long run recovery of sunk costs when setting prices.

If it is determined that a regulatory contract exists, there would be a number of implications for the assessment of the price level beyond which it can reasonably be said the owners of the MSP are exercising market power. In fact, the decision as to whether to use the new entrant test or the regulatory contract approach to determine the extent to which the MSP may be exercising market power will impact each of the factors used to calculate the maximum price. For example, compared to the hypothetical new entrant test:

? the asset valuation will no longer depend on the most efficient method for supplying the NSW/ACT market with delivered gas but will depend on the regulatory contract;

? the extent to which sunk costs have been recovered through past pricing decisions will be taken into account when setting the asset valuation in any given year;

? compensation for anticipated future technological change will be lower than that under the hypothetical new entrant test, reflecting the lower level of risk incurred by the firm; and

? the regulatory contract approach may determine revenues rather than prices, therefore, in setting prices the appropriate level of volume may be the firm's volumes rather than market volumes.

To the extent that the Gas Code represents the best description of the regulatory contract then the prices determined under the Gas Code may be a valid test of the exercise of market power. We note that the Gas Code allows for the departure from hypothetical new entrant prices on each of the above points.

7. CONCLUSIONS

In this report, we consider three alternative tests for exercise of market power for the period 1999-2002 for MSP:

1. The hypothetical new entrant test, which considers whether prices at a point in time are higher than those that could be expected to prevail under 'competitive' conditions. Under this test, prices are assessed on the basis of:

   - the current costs associated with the most efficient means of meeting market demand; and
   - market volumes.

   The application of this test exposes the firm to competitive costs associated with technological advances. Compensation for these costs must be incorporated into the test.

2. A test based on NECG's definition of the hypothetical new entrant test combined with the proposition that the entry of a new firm does not cause the competitive price to rise.

3. The regulatory contract approach, which allows a firm to recover its reasonable or agreed costs over the life of the asset. Under this approach, prices may be assessed on the basis of:

   - the level of investment and costs the firm is "allowed" to recover and the extent to which the firm has recovered this investment through past prices; and
   - the firm-specific volume of output.

   The firm would not be exposed to the same magnitude of risks as under the hypothetical new entrant test, however, the compensation for those risks would be correspondingly lower.

The test that is most appropriate in any given situation will depend on the extent to which a regulatory contract can be said to exist. However, it is possible to apply all of these tests to the MSP's current prices. For each of the above tests we calculate that MSP prices are currently 30 percent above the maximum level at which we would conclude no exercise of market power is evident. As such, we conclude that MSP's prices for the period 1999-2002 reflect the exercise of market power.

APPENDIX A. HISTORICAL RATE OF PRODUCTIVITY CHANGE

Historical estimate of the rate of technological change ('p') on the Moomba to Sydney Pipeline (MSP) is calculated as the rate of 'p' that equates the historical capital expenditure on the MSP (in current prices) with the current estimates of the ORC.

To calculate the rate of technological change requires the following three steps:

- estimate annual historical capital expenditure exclusive of replacement capital in current prices;
- estimate the replacement cost of the assets to which the above historical capital expenditure relates; and
- calculate the rate of technological change per year that adjusts historical expenditure to be equal to replacement cost.

We base our estimates of replacement cost on the Venton and Associates Pty Ltd optimised replacement cost (ORC) study provided by EAPL to the ACCC and subsequently adopted by the ACCC with some amendments. We base our estimates of historical capital expenditure on the annual reports of the Pipeline Authority.

A.1. Historical Capital Expenditure in Current Prices

The historical capital expenditure is extracted from the annual reports of the Pipeline Authority and is reproduced in Table A below. It is necessary to adjust these figures from the Pipeline Authority as the purpose of these reports was to satisfy the laws governing company reports rather than to provide data on the historical cost of current assets. Therefore NERA has adjusted the reported capital investment to:

- remove any optimised and disposed assets;
- remove replacement capital expenditure; and
- adjust historical expenditure for inflation to derive current prices.

Removing Optimised and Disposed Assets

As the aim is to compare historic capital expenditure with current ORC estimates it is necessary to remove any historical capital expenditure on assets that have subsequently been either optimised or disposed of and are therefore excluded from the ORC estimates.

NERA's understanding is that the only major asset disposed / optimised in the MSP network is the Moomba bypass. Therefore all capital expenditure and disposal revenue associated with the Moomba bypass has been excluded from our historical capital expenditure data. However, the Moomba bypass does highlight an important issue for our analysis. Although

the annual reports show that the Moomba bypass cost over $23 million to construct they only show disposals of for just over $1.1 million. This is due to the financial nature of annual reports which report cash expenditures. To the extent that there are other disposals associated with the other pipeline assets where both the investment and disposal have not been removed our analysis will likely over state the initial capital base (and thereby 'p') as the cash raised by the disposals of asset tends to be less than the initial cost of the investment.

Removing the Replacement Capital Expenditure

In addition to the Moomba bypass vehicles, equipment and stores have also been excluded from the ORC and the historical capital expenditure data. This is because much of the historical value of this capital expenditure is in the nature of replacement capital expenditure (eg, replacement of a vehicle). If all such historical capital expenditure was included then it would be the equivalent of assuming that every vehicle purchased since the MSP's inception is still in service and is included in the ORC. This is clearly not the case and the most accurate way to ensure that this form of 'double counting' does not occur is to remove such expenditures / assets from both the historical data and the ORC.

In addition, there are at least eight years during which investment on the Moomba to Wilton pipeline appears to be too small to be anything other than replacement capital.[36] We have used the average of those eight years as an estimate of annual replacement capital expenditure and have deducted this amount from the capital expenditure figures in table A for the years 1978-1993. We have not removed any replacement capital expenditure from any of the other pipelines.

Current Prices of the Initial Capital Investment

The initial capital investment and all subsequent capital investments have been scaled up by the ABS All Groups Weighted Average of Eight Cities Consumer Price Index.

A.2. Optimised Replacement Costs

As historical capital expenditures are extracted from the annual reports of the Pipeline Authority figures are only available from the period of 1977 to 1994. It is NERA's understanding that the only major capital expenditure to occur from the period of 1995 to 2000 is the Wagga to Culcairn pipeline and the Young to Lithgow compressor. These figures have therefore been removed from the ORC calculations so that we are comparing the costs of the same assets.

[36] The years include, 1981-83, 1985, 1988-99, 1992-93.

The ACCC ORC[37] estimate from the draft decision has been reproduced in Table B with the assets to be excluded from our analysis highlighted. Table C shows the adjusted EAPL ORC.[38] As the EAPL ORC does not identify either the Young to Lithgow compressor or the Wagga to Calcairn pipeline asset values, the ACCC values for these assets has been deducted from the total ORC value given by EAPL.

We also note that to the extent there are any optimisations of existing assets in the ORC (other than the Moomba bypass – which has been excluded from historical data) our analysis will tend to bias the estimated value of 'p' above its true value.

A.3. Calculate the Implied Rate of Technical Improvement

The rate of technical improvement was then calculated by adding a productivity factor that annually reduced the productivity adjusted cost of historical capital investment until the productivity adjusted historical cost equals the ORC estimates. Using the ACCC ORC value implies a 'p' figure of 0.47 per cent for the weighted average of all pipelines in the MSP. As EAPL has submitted a higher 2000 ORC estimate this implies a lower 'p' factor with the estimate for the total system equal to 0.07 per cent.

[37] ACCC, Draft Decision *Access Arrangement by East Australian Pipeline Limited for the Moomba to Sydney Pipeline System*, 19 December 2000.

[38] ACCC, *Op Cit*, Table 2.6.

Table A – Historic Capital Expenditure

Capital expenditure (estimates based on increase in historical cost asset values)

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	$'000																	
Moomba-Wilton	226,936	2,096	7,709	1,370	252	331	259	1,175	308	1,093	17,667	723	669	18,138	2,114	651	612	
Young-Wagga Wagga						20,413	94	7	-7	19	2							
Dalton-Canberra						8,709	176	-19	36	1	3	0	-1	0				
Moomba bypass							5,888	15,110	2,643	-661	-38	-405	-70					
Young-Lithgow												30,000						
Brewongle-Oberon												4,158	5	4				
Junee-Griffith																	10,957	8,148
Vehicles, equipment	98	22	23	29	-13	157	6	7	16	52	23	61	50	229				
Stores	48	12	7	18	20	5	14	4	16	7	1	47	-6	60	-23	8	36	
Total capital cost	227,082	2,130	7,739	1,417	259	29,615	6,437	16,284	3,012	511	17,658	34,584	647	18,431	2,091	659	11,605	8,148
Adjusted Capital Expenditure	226,936	2,096	7,709	1,370	252	29,453	529	1,163	337	1,113	17,672	34,881	673	18,142	2,114	651	11,569	8,148

Removed from Capital Expenditure

Table B – ACCC Adjusted ORC

	Moomba to Wilton	Young to Wagga	Wagga to Culcairn	Dalton to Canberra	Young to Lithgow	Junee to Griffith	Total ($000)
Pipelines	748,748	34,632	23,088	15,550	40,937	24,823	887,779
Compressors	49,732	0	0	0	1,815	0	51,547
Metering	9,410	1,063	709	1,906	4,211	3,185	20,483
Plant etc	8,678	383	256	188	504	301	10,310
Mobile equipment	5,050	223	149	109	294	175	6,000
Total	821,619	36,302	24,201	17,752	47,761	28,484	976,119
Adjusted ACCC ORC	816,569	36,079	0	17,643	45,652	28,309	944,252

Not in Capital Expenditure

Table C – EAPL OCR Estimate

	$'million
Pipeline – Moomba to Wilton	819.9
Pipeline – Young to Calcairn	59.4
Pipeline – Laterals	90.8
Compressors	58.1
Metering	14.0
Plant, Machinery, Equipment	10.3
Mobile Equipment	6.0
less	
Mobile Equipment	6.0
Young to Lithgow Compressor	1.8
Wagga to Calcairn Pipeline	24.1
Adjusted ORC	1026.6