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**Attachment A:  
Analysis of Capital Expenditure  
and Unaccounted-for-Gas**

**Submission to the  
Queensland Competition Authority on the Draft Decision  
for the Access Arrangements  
for Gas Distribution Networks**

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## 1 Introduction

This submission to the QCA outlines the reasoning which supports the capital expenditure program proposed by Allgas in its Access Arrangement. The information and arguments presented here demonstrate that the QCA's Draft Decision inappropriately excludes from the Capital Base capital expenditure associated with the renewal of mains and is not consistent with the *National Third Party Access Code for Natural Gas Pipeline Systems* (the Code). As well, the following analysis demonstrates that the proposed disallowance of actual Unaccounted-for-Gas (UAG) costs from the required revenue leads to suboptimal outcomes.

Allgas' proposed approach to mains renewal and inclusion of actual Unaccounted-for-Gas costs in the required revenue is based on a desire to minimise the cost of delivering the most appropriate forward looking gas distribution network for current and future customers. This is consistent with Section 8.1 of the Code which states the following principle of the reference tariff policy.

*A Reference Tariff and Reference Tariff Policy should be designed with a view to achieving the following objectives:*

*(a) providing the Service Provider with the opportunity to earn a stream of revenue that recovers the efficient costs of delivering the Reference Service over the expected life of the assets used in delivering that Service...*

This report demonstrates that Allgas has delivered the least cost and efficient outcome for users of the network.

## 2 Code requirements regarding capital expenditure

Allgas submits that the Code provides further reasons why the Allgas costs of capital expenditure represent efficient and prudent management of the network, and that the QCA must allow the recovery of such costs. Allgas believes that the QCA cannot reasonably refuse to include allowance for the Allgas capital program under the Code.

The Code has a number of provisions by way of a prudence test for any capital expenditure. The logic is as follows (as per QCA's draft decision): -

Firstly, QCA must be satisfied that there is compliance with (both):

- (Section 8.2(e)) of the Code - that costs must be best estimates arrived at on a reasonable basis - The QCA's own consultants Brown and Root reported that the Allgas cost estimates were reasonable; and
- (Section 8.16(a)) of the Code that costs must not exceed those which would be incurred by a prudent service provider - This test included technical and economic prudence (Section 8.17). The analysis of this report, that renewal now is a least-cost solution compared to either earlier or later renewal, is sufficient to demonstrate prudence.

If the QCA is satisfied that the program passes the above two tests then the Code requires that it also be satisfied that the program meets any one of the following three tests: -

- the economic feasibility test (8.16(b)(i));
- the system wide benefits test (8.16(b)(ii));

- the safety, integrity or contractual responsibilities test (8.16(b)(iii)).
- (a) Economic feasibility is demonstrated by the illustrative calculation in Appendix A of this report submitted to the QCA on a confidential basis.
- (b) System-wide benefits are generated by the ability to operate the mains network at higher pressures post-renewal. These benefits are noted in section 5 below.
- (c) The safety and integrity of the network would be enhanced by the capital program to replace ageing mains and augment the system as detailed below.

The following sections of this report expand on the above.

The regulatory environment set by the Code provides for distributors to pay for UAG and thereby to make explicit trade-offs between operating and capital costs. In this environment the benchmarking of UAG is clearly inappropriate since it effectively forecloses options of operating at a somewhat high level of UAG when doing so might minimise overall costs to customers. At every point in time the regulatory environment provides for distributors to assess the benefits of capital investment (to reduce operating costs and UAG and increase sales) against the actual costs of UAG and ongoing leak maintenance. In this environment distributors will make rational and prudent decisions about the trade-offs and hence the correct price outcome will be achieved.

### **3 The least cost outcome**

The two critical management decisions are:

1. When should the mains renewal be done? and
2. Among the available alternatives for managing the UAG issue, which of them will lead to the preferred long-term outcomes for customers?

Ideally these decisions should be taken in a manner which promotes the least cost method of providing the desired level and quality of service. Regulation, as a factor which will influence these decisions, should ideally encourage the adoption of this least cost solution. Unfortunately, the QCA approaches to these issues are likely to have the unintended consequence of steering these decisions away from the least cost solution.

Taking mains renewals first, there are two compelling reasons for undertaking it as proposed within the current five-year regulatory period.

- Firstly the hard engineering and accounting data make it clear that significant parts of the existing cast iron mains network are life expired now. This data highlights the excessive leakage, unaccounted for gas, and maintenance costs symptomatic of the need for renewal.
- Secondly the inability to operate these life-expired cast iron mains at higher pressures (without paying an unacceptable penalty through gas leakage) is likely to inhibit near-term prospects for sales growth and expansion.

By refusing to permit Allgas to include the full capital cost of renewed cast iron mains in the Capital Base within the current regulatory period, the QCA is effectively delaying Allgas' ability to undertake this necessary work. The effect of this QCA draft decision is to encourage Allgas to do mains renewal later than the optimal time, thereby inflicting on Allgas higher UAG and maintenance costs, as well as the foregone network growth opportunities.

Turning second to the QCA's draft decision on permitted recovery of UAG costs, by preferring nationwide benchmarks to actual UAG costs the QCA is creating a strong incentive for premature replacement of assets. When neither asset replacement nor UAG costs are distorted by regulatory involvement, a firm can be expected to trade off the net present value of asset replacement against the net present value of gas losses through leakage, and arrive at a cost-minimising balance point. If regulation prevents recovery of actual UAG costs (as the QCA proposes to do) then the balance is destroyed, and the firm has a commercial imperative to incur (and recover) the capital costs associated with replacement immediately, in order to avoid continuing to incur the irrecoverable UAG costs.

This balance would not be restored by preventing the recovery of either replacement capital expenditure or actual UAG costs. Doing that would only have the effect of completely eliminating the useful economic signals, and making it far less probable that the least-cost management decisions would be taken.

This submission enlarges on this line of argument and provides supporting evidence and explanation.

#### **4 An overview of Allgas capital program**

QCA's Draft Decision on the Gas Undertaking section 14.3 requires Allgas to remove all capital expenditure associated with the renewal of mains, saying:

"The Authority considers that acceptance of a DORC valuation for the purpose of determining the ICB implicitly assumes that the network in question is in good working order, and therefore should not require accelerated mains replacement".

This viewpoint is puzzling since a DORC valuation is in no way inconsistent with the practical necessity of replacing life-expired network elements from time to time. The depreciation stage of a DORC valuation explicitly recognises that assets in poor condition approaching replacement are valued at levels substantially below their optimised replacement cost.

If the emphasis in the QCA's statement is on "*accelerated*" replacement, then presumably the concern is that customers will pay more than they might otherwise if assets are replaced before they are actually life expired. Following the logic of such an argument, if the DORC valuation ascribed positive value to assets which were about to be replaced, then replacing them would involve a writedown of that remaining value which would be chargeable to customers. Thus, in order to minimise the total cost of service, it would be preferable to replace assets only once the DORC value was completely consumed through use.

Of course, from a practical perspective, it is nearly impossible to replace each individual asset element at the precise moment that its DORC valuation equals zero. It is generally more economical to replace runs of gas mains of a minimum efficient scale, rather than in piecemeal fashion. Therefore a least cost renewal program must represent a balance between a range of factors, including:

- The amount of residual DORC value at the date of replacement which must be written off;
- Efficiency gains from carrying out mains renewals at minimum efficient scale, as opposed to piecemeal renewal;
- The financial benefits of bringing forward cost savings associated with reduced maintenance costs and reduced UAG for the new mains;

- Benefits to sales and market share growth through augmentation benefits of present mains renewals;
- The present financial costs of the capital expenditure.

#### **4.1 Clarification of the renewal capital work**

QCA's requirement for Allgas to remove all renewals capital appears based on a view that the cast-iron network is not fully depreciated. In fact, QCA's own consultants, Brown and Root, who reviewed the work of GHD in valuing the Allgas assets acknowledge that a significant portion of the Allgas cast-iron mains exceed their useful lives. The facts are:-

- Some 30% of the Allgas cast-iron mains are fully depreciated – that is, the average age of that group of assets exceeds the useful life of 80 years.
- A further 25% of the Allgas cast-iron mains have an average group age of 64 years. Within this group there is a significant spread of ages and some individual sections will be at or beyond the expected life of 80 years.
- A further 17% have an average group age of 44 years – again some of these mains may be fully depreciated.

The Allgas renewals program is targeted to replace some 190 km of cast-iron mains over a four-year period. From the above average asset group ages, an estimate has been made of the total length of fully depreciated cast-iron mains in the Allgas network. This estimate is based on the known fully depreciated assets (81km) plus a conservative amount (30%) of the 64-year average asset groups. This total estimate of 101 km represents some 53% of the total renewals.

“Renewals” programs inevitably cover a mixture of fully depreciated assets plus some in reasonable condition which are most efficiently renewed at the same time as the fully depreciated assets.

#### **4.2 How much residual DORC value would be written off?**

In principle, any accelerated replacement of assets has a potential to lead to customer outcomes which do not reflect least cost of service. The evaluation of this concern must examine the empirical facts of each particular instance. In the present case, the DORC valuation performed for Allgas by GHD made the assumption that cast iron gas mains which were fully depreciated in a book sense (actual age was higher than the assumed engineering life) had five years life remaining. This assumption had the effect of ascribing some regulatory asset value to mains which are effectively life expired and which Allgas intends to replace within the present regulatory period.

Careful examination of the spreadsheets used by GHD to arrive at their DORC valuation reveals that the cast iron mains in this category are situated in the Brisbane and Toowoomba networks only. The amount of DORC value represented by these cast iron mains is approximately \$182,000. This figure represents about 0.1% of the DORC valuation for the Allgas asset base overall, and is therefore immaterially small. It is this immaterial DORC valuation which would need to be written off if these cast iron mains which are older than the assumed engineering life are replaced within the current regulatory period.

Seen in light of this empirical data, the QCA's concern about 'accelerated' renewal of life-expired mains leading to excess consumer costs is clearly misplaced.

### **4.3 Key Drivers of Program**

The Allgas renewals program is centred on several key drivers as follows: -

- The Allgas cast-iron and non-protected steel network (the older network) will need to be replaced eventually. Currently, parts of the network have exceeded their expected useful lives. The key question for a renewal program is timing.
- In the case of Allgas the timing decision is based around the cost trade-offs, namely the cost of the expenditure weighed against the reductions in operating costs and UAG that arise from the capital expenditure, the benefits from new customer connections, the ability to use high input appliances on the network, and to meet increased demand of existing customers. As parts of the older network become more deteriorated, costs of UAG and maintenance increase, the potential for new connections is constrained, there are more supply problems for existing customers, and eventually these costs exceed the annual equivalent value of the capital to carry out the work.
- The renewals program has been prioritised to ensure that the areas of greatest opportunity are renewed first. That is, those areas scheduled to be renewed first are identified where there is emerging evidence of constraints on capacity and UAG and maintenance costs are highest. A further consideration is the opportunity for customer growth that arises in each area where augmentation /renewal is feasible.
- A further consideration in any capital program is the logical packaging of replacement works to ensure that scale economies are achieved but also that the network is not augmented prematurely. It is useful to consider the typical situation where some form of repairs/replacement is required.
- The cast-iron network consists of sections of pipe, each approximately 3m long, connected using mechanical joints. The condition of these existing sections of pipe varies depending on the original design, the ground type, external factors such as traffic flows / vibration and gas quality. Hence adjoining pipe sections can be in quite different condition after an identical period in service – one section might have significant leaks while an adjoining section may be in good condition. It is useful to consider the range of options faced by a network provider in regard to repair or replacement.
- On one hand a network provider could locate the site of individual leaks in an area and repair or replace only the leaking sections. This would result in a “patch-work” system that required continual revisits to carry out further work. This approach is ultimately extremely inefficient due to the high fixed costs of establishing work-sites and isolating the section of mains to carry out the work. In this case the replaced section of the network could not be utilised to its full potential due to the pressure constraint of the older pipework even though it had not reached the end of its technical life.
- At the other extreme is a program that effectively replaces the entire cast-iron mains system in one pass. Such a program would result in a very efficient use of capital but it could be argued that large parts of the network would be replaced prematurely. That is, while a fully depreciated (80-year-old) section would be replaced as part of the program, so might a relatively modern section in good condition.
- Inevitably, the correct answer is a compromise between the two extremes. That is, any program should be developed to enable reasonable scale economies but yet it should not

replace extensive amounts of mains that are in good condition. Such is the program proposed by Allgas.

Allgas submits that the capital expenditure proposal has been developed based on appropriate technical and economic drivers. These include an economic viability test (cost reductions including increase in sales exceed capital costs), timing decisions (again based on the optimum reduction in ongoing costs given the capital expenditure), appropriate prioritisation and packaging to provide for efficiency of expenditure. Consideration of the growth strategy for the network is incorporated into the capital expenditure program.

## **5 Augmentation benefits of mains renewal**

So far the emphasis has been on productive efficiency—preserving economic signals which will lead management to select a least cost of service approach. There are also strong dynamic efficiency considerations which support the present renewal of life-expired cast iron mains. These arise primarily because renewed cast iron mains would be able to sustain a higher level and quality of service than the mains which they replace.

### ***5.1 Aging low-pressure mains inadequate to meet future demands***

To achieve sales growth new customers must be added to the network and customers must be encouraged to connect high volume and high demand appliances. At present some of these appliances cannot be utilised due to capacity constraints in the network. Therefore the replacement of mains to enable higher pressure operation clearly creates benefits by augmenting the network to meet customers' increased demand.

The proposed capital expenditure is consistent with the Allgas growth objectives for the network. At present a number of older parts of the network are run at very low pressure. As discussed later, pressure is limited to maintain the UAG at reasonable levels which places constraints on the use of some of the modern gas appliances which require a greater volume of gas and are in direct competition with alternative electrical appliances. Many of the modern gas appliances<sup>1</sup> require high hourly consumption. Rehabilitation will enable the network to run at a much higher pressure (100 to 200 kPa) which provides for a greater volume of gas, which is required for the efficient operation of the network with the new appliances.

This forward looking view of domestic demand patterns highlights the impracticality of alternative solutions to the UAG problem which might involve lower pressure operation. Reducing pressures in many parts of the network, might alleviate the UAG problem, however, it would create supply problems for most of the 30,000 customers that are supplied from the low/medium pressure networks. It is in the interests of Allgas and the community that the current gas volumes are not compromised by pressure reduction solely for the purpose of UAG reduction.

### ***5.2 Economically sustainable network growth***

The network strategy is to encourage domestic customers to use gas for cooking and hot water due to the high fixed cost of connection. The mains network must be able to operate at sufficient pressure to reliably supply these new customers with sufficient gas to support these two primary

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<sup>1</sup> For example, instantaneous hot water units and pool heaters. The adoption of such appliances is seen as important in influencing domestic consumers to switch energy sources from electricity to gas.

appliances. Thus the improvements to maximum operating pressure which mains renewal will deliver are critical to Allgas' overall strategy for network growth.

For this reason, and to enable reliable supply of newer high performance appliances, the present period renewal of mains is an essential investment in network augmentation. This fact argues further for the importance of being permitted to include these renewals in the Capital Base.

## 6 Disallowance of actual UAG

In its Draft Decision, the QCA has refused to permit Allgas to recover its actual UAG costs within the permitted revenue, stating that the Allgas UAG rate is in excess of relevant national benchmarks. Instead, the QCA has recommended that national benchmark levels of UAG be used in the permitted revenue calculation.

This essentially arbitrary reduction in UAG fails to recognise the obvious trade-offs that exist for any network service provider between capital expenditure, maintenance costs and UAG costs. Any network can achieve a low level of UAG if sufficient capital or operational and maintenance expenditure is injected to replace or repair leaking mains, and/or by continuing to reduce pressures thus creating major supply problems for existing customers. However, Allgas contends that the reduction in UAG is not the objective in itself rather: -

- Minimum safety requirements must be met – that is, if a system has leaks that pose a threat to the public or property then the leaks must be repaired;
- A network service provider has an obligation to maintain UAG at reasonable levels by way of protection of the environment;
- After the above two issues are considered the fundamental consideration is lowest price outcomes for customers.

Focusing primarily here on the last of these points, it has been noted in the introduction to this submission that the actual UAG cost signal plays an important role in guiding management decisions towards a least cost of service solution. This point is best demonstrated using an illustrative calculation using realistic numbers, such as the one contained in Appendix A to this report that has been submitted to the QCA on a confidential basis.

Appendix A compares the net present value of customer costs under each of three scenarios:

1. mains renewals done within the present regulatory period;
2. mains renewals that have been completed within the prior regulatory period; and
3. mains renewals to be done in the regulatory period following the present one.

Scenario 1 corresponds to the capital works program and UAG cost profile proposed by Allgas for regulatory approval (current renewal of mains). Scenario 3 (future renewal of mains) represents the capital works program to which the QCA's draft decision is most likely to steer Allgas. Scenario 2 (past renewal of mains) represents the capital works program to which Allgas would have been steered had the QCA's present approach to UAG cost recovery been in force in the prior regulatory period.

If Allgas had renewed the mains prematurely this would have increased the DORC value as illustrated and this decision would have been effectively substituting a recoverable cost (investment) for an irrecoverable cost (actual UAG expense).

The calculation in appendix A shows that, under the realistic assumptions employed and assuming no demand growth (in order to isolate the issues under consideration in this section),<sup>2</sup> scenario 1 represents the solution which entails the least cost to consumers on a net present value basis. This finding is robust in that the net present values over 5, 10, and 15 years are all minimised under scenario 1.

In qualitative terms, the drivers of this outcome are as follows. Scenario 2 is not least cost because it entails renewals which are so premature that significant asset writedowns must be incurred. While some asset writedowns are entailed in scenario 1 also, these are immaterially small compared to the overall DORC asset valuation of the network (0.1%, as noted above). Scenario 3 is not least cost because it entails excessive maintenance and UAG costs for an extended period of time (five years longer than in scenario 1, and ten years longer than in scenario 3).

From this analysis it is reasonable to conclude that the proposed capital replacement program for cast iron mains is the least cost solution. In light of this conclusion, regulatory interventions which serve to delay renewals beyond the optimal time (such as the refusal to permit renewals in the capital base in this regulatory period), or which serve to motivate premature renewals (such as refusing to permit recovery of actual UAG costs) will reduce the probability of management decisions which will promote the least cost outcome. A different set of management possibilities may result in the closure of existing parts of the network.

## **6.1 QCA requirements**

The QCA seems to recognise that Allgas could have invested any time in the past in renewing its entire network. This would have resulted in a legitimate DORC asset valuation far in excess of the current Allgas DORC. The Draft Decision notes -

*In addition, the Authority recognises that, to some extent, the DORC will be reflective of past asset management practices and will be higher for a service provider who has spent more on replacement of the network in the past. (p151)*

Punishing Allgas now because it chose in the past to reduce costs to consumers by delaying renewals until they were economically justified, would be somewhat antithetical to the goals of incentive regulation generally.

## **6.2 Customer requirements**

Appendix A shows that the prices resulting from either earlier or later replacement would be demonstrably higher than currently proposed by Allgas. Customers want the lowest price outcome and Allgas considers this is delivered to customers in the proposed package of expenditures in the access arrangement, which reflects the Allgas corporate strategies.

QCA has asserted that:

*"...capital expenditure is already implicitly included in the service provider's asset base through the adoption of a DORC value, and accordingly, will not be further recognised through any increase to the capital base as such expenditure is incurred." (p223)*

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<sup>2</sup> Note that if positive demand growth were assumed, then the incentive to renew now rather than in the future would be even stronger.

This submission has demonstrated why this assertion is not correct. As noted above, the DORC and prices would have been significantly higher had capital been invested in the past to reduce UAG. It is simply not correct that the capital has already been included by virtue of using a DORC valuation. Moreover, delaying replacement of mains and disallowing actual UAG costs is no more likely to lead to an efficient outcome.

Allgas submits that the capital expenditure program proposed, together with the economic signals created by actual UAG costs create the greatest likelihood that customers will benefit from the future network which is most productively and dynamically efficient. This is consistent with the General Principles of the Reference Tariff Policy (Section 8.1) of the Code. Allgas is committed to providing a network with the lowest feasible price outcome.