



Report to

Independent Pricing and Regulatory Tribunal of NSW

## Finalisation of AGLGN demand forecasts

8 April 2005



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## 1 Introduction

In December 2004 the Independent Pricing and Regulatory Tribunal of NSW (the Tribunal) handed down its draft decision into the revised access arrangements for the AGL Gas Networks (AGLGN)<sup>1</sup>. In terms of the demand forecast the Tribunal required two amendments which are reproduced below.

### **Amendment 7 - Demand forecasts**

The proposed access arrangement must be amended so that the demand forecasts used to determine total revenue and reference tariffs are those submitted by AGLGN in June 2004 (as set out in Table 6.2 of this report).

### **Amendment 8 - Contracted MDQ for major contract customer demand forecasts**

The proposed access arrangement must be further amended so that demand forecasts used to determine total revenue and reference tariffs for major contract customers are based on these customers' actual levels of contracted MDQ for 2002/03.

Subsequent to the draft decision AGLGN has proposed further revisions to its demand forecasts for the tariff market to take into account developments in assumptions and modelling of gas usage for hot water.

The Tribunal has asked McLennan Magasanik Associates (MMA) to:

- Ensure AGLGN's modelling incorporates the Tribunal's amendments
- Understand the logic behind the new revisions to the proposed forecasts for the tariff market residential load
- Comment on whether the revised forecasts are "best estimates arrived at on a reasonable basis"

This report sets out the review. It is set out in two Chapters. Chapter 2 reviews the revised sales forecasts for the tariff market (customers with consumption < 10 TJ pa) while Chapter 3 reviews the revised maximum daily quantity (MDQ) forecasts for the contract market (customers with consumption > 10 TJ pa).

It should be noted that the point of departure for this assignment has been the Tribunal's amendments in its Draft Decision. A corollary of using this point of departure is the acceptance of the AGLGN methodology and assumptions used in arriving at this point. Again, MMA has proceeded on this basis.

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<sup>1</sup> Independent Pricing and Regulatory Tribunal of NSW, "Revised Access Arrangement for AGL Gas Networks, Draft Decision", December 2004

As was the case for the initial review of demand forecasts carried out by MMA, the process has been iterative and cooperative. MMA has reviewed the revised AGLGN forecasts. AGLGN has taken into account some parts of the MMA review in providing updated revised forecasts on 6 April 2005 and disagreed with other parts. This report documents the process of the MMA review. It takes into account the AGLGN comments and the revised forecasts provided on 6 April 2005.

## 2 Tariff market forecasts

### 2.1 Tribunal amendment

The Tribunal has required AGLGN to adopt the demand forecasts for the Tariff market contained in Table 6.2 of the Tribunal's draft decision. The Table is reproduced below.

**Table 2.1: Table 6.2 AGLGN's revised demand forecasts (June 2004)**

		2005/06	2006/07	2007/08	2008/09	2009/10
Customer site numbers as at 30 June		998495	1035158	1072166	1109475	1147155
Tariff market load, TJ	Residential	22975	23999	25039	26094	27168
	Business	11109	11159	11166	11213	11262
Contract market load, TJ	Total ACQ	65000	66238	66230	66369	66608
	Total MDQ	278.9	279.5	280.5	281.2	281.8

Source: Draft Decision page 39

### 2.2 AGLGN revisions

AGLGN has started with the residential and business loads provided in Table 6.2 of the Draft Decision. It has retained the business loads unchanged from the Table.

It has, however, revised its forecasts for the residential market for three reasons, all related to the fitting and usage of AAA water appliances:

- A forecast increase in the level of retrofits of existing houses with AAA showerheads and tap fittings over the early years of the regulatory period.
- Announced NSW Government policy requiring that all houses sold from 1 July 2007 are fully equipped with AAA showerheads and tap fittings.
- A reduction in the level of energy savings expected from new homes from an estimated 29% to an assumed 23% following advice from the Institute of Sustainable Futures (ISF).

Increasing the water efficiency of showerheads and tap fittings for both new and existing houses is expected to reduce the use of hot water and consequently the energy used in heating hot water.

## 2.3 Increase in level of retrofits

### 2.3.1 Number of retrofits – initial MMA review

According to AGLGN the level of retrofits of homes with AAA devices is forecast to increase from an average of 50,000 pa over the past five years to 73,000 in 2004/05 and 96,000 in 2005/06 and 2006/07. AGLGN has estimated the net number of retrofits over the baseline level by calculating the number of retrofits expected in any year and subtracting the average over the past 5 years (eg 73,000 – 50,000 in 2004/05). It has then multiplied this number by the proportion of customers who take gas by the energy savings expected per retrofit (2.93 GJ pa).

MMA considers the underlying number of 50,000 retrofits to be reasonable. According to Sydney Water Corporation (SWC) numbers there were about 233,000 retrofits between 1999/00 and 2003/04<sup>2</sup>. Given that there were few in the year 1998/99, an average of 50,000 over the five-year period 1998/99 to 2003/04 over which most of the analysis has taken place appears reasonable.

However, the source of the assumptions that there would be 75,000 retrofits in 2004/05 and then 96,000 in 2005/06 and 2006/07 is unclear. According to an MMA report to IPART<sup>3</sup>, SWC is planning retrofits of 173,000 homes in total over the period 2004/05 to 2009/10. While other corporations (Hunter Water Corporation and Gosford City and Wyong Shire Councils are also planning some level of retrofits these will not add up to the numbers proposed by AGLGN.

AGLGN provided a memo from ISF stating that a (feasible) scenario would see an additional 240,000 houses being retrofitted between December 2004 and 2006/07. No further justification of this assessment was initially provided by ISF or AGLGN.

MMA initially considered that in the absence of further substantiation the number of retrofits should be assumed to be 173,000 houses in line with the expectations during the MMA review of the SWC demand forecasts.

### 2.3.2 Number of retrofits – subsequent consideration

AGLGN supported its initial position with regard to retrofits by SWC by stating that ISF has significant expertise in water- saving devices and has provided direct input into the NSW Government. As well, AGLGN stated that discussions with an employee of SWC had indicated that they were targeting 270,000 homes over the next three years, consistent with the figures provided by ISF.

SWC has been approached by IPART to clarify this issue. It appears that SWC has

<sup>2</sup> Sydney Water, "Water Conservation & Recycling Implementation Report 2003-04", 2004.

<sup>3</sup> McLennan Magasanik Associates Final Report to IPART, "Review of consumption forecasts. NSW metropolitan water agencies", December 21 2004, available at [www.ipart.nsw.gov.au](http://www.ipart.nsw.gov.au).

revised its retrofit targets to reflect the Metropolitan water strategy. This means that the number of retrofits by 1 July 2007 is in line with that expected by AGLGN.

IPART has sought written confirmation from SWC on this point but it has not been provided at the time of writing this report.

**In light of the discussions between IPART and SWC the forecast number of SWC retrofits assumed by AGLGN appear reasonable pending confirmation after the email from SWC is received by IPART.**

Subsequent to the MMA draft review AGLGN has also included some retrofits for Hunter Water Corporation (5,000 pa) and for Gosford City Council and Wyong Shire Council (1,000 each pa).

MMA considers it appropriate to include consideration of retrofits in these areas. While MMA can quibble about the methodology here (for example, the AGLGN methodology does not subtract baseline retrofit levels, as it did for SWC, and the penetration rates of gas hot water in these areas is different to in Sydney), MMA considers the differences to be immaterial.

**MMA considers the number of retrofits assumed for areas outside Sydney/Wollongong to be reasonable.**

## 2.4 Average savings per retrofit

AGLGN has estimated an energy saving of 2.93 GJ per retrofit. This appears to be calculated as the average variable use per hot water system from continuous use (15.4 GJ) multiplied by the 19% saving per retrofit estimated by the Institute for Sustainable Futures (ISF)<sup>4</sup>. ISF has recommended that AGLGN change its assumptions about hot water savings:

“Because of this, and other minor adjustments to assumptions, it was recommended that the levels of hot water savings due to adoption of water efficient devices be changed from 28% to 23% for new houses affected by BASIX in NSW and to 19% for the retrofits of existing housing stock”

MMA considers the ISF estimate of hot water savings for both retrofitted and new houses to be reasonable. In the case of new dwellings they match well the 22% estimated by MMA in its report to the Tribunal.

The AGLGN methodology for retrofits estimates energy savings as a proportion of that used by continuous hot water systems. MMA considers this appropriate as it excludes the impact of standing losses. AGLGN has based its analysis on energy used by continuous water heaters for dwellings which do not have Central Hot Water (CHW). The impact of retrofits on units with CHW would be expected to be less as these users use less energy.

<sup>4</sup> T Berry, Research Director, Institute for Sustainable Futures, University of Technology Sydney letter to D Anthonisz headed “Re: Hot water savings from water efficient devices”. 18 March 2005.



However, given that retrofits are likely to be undertaken by larger water users and are considered less likely in apartments with renters we consider the impact here to be immaterial.

**MMA considers the average energy savings per retrofit assumed by AGLGN to be reasonable.**

## 2.5 Basix on sales of existing houses from 2007

AGLGN has assumed that the water efficient component of Basix will apply to new house sold from 1 July 2007. This is in line with announcements from the NSW Government's water plan announcement.

"From 1 July 2007, a minimum level of water efficiency will be required when a dwelling is sold. The efficiency level required will be at least equivalent to that which can be achieved by installing low-flow showerheads, tap fittings and toilet flush arrestors. To minimise household compliance costs, the community are encouraged to participate in the Sydney Water Corporation's retrofit program whereby these devices will be supplied and installed in their homes for only \$22."<sup>5</sup>

Although no mechanism has been announced for the implementation of the program, AGLGN has assumed that it will be fully implemented by the target date and will achieve the same saving as the retrofit program. MMA considers this to be a reasonable regulatory assumption but believes it is optimistic to assume that the program will achieve 100% success rate from 1 July 2007.

MMA does, however, have difficulties with the assumptions about AGLGN assumptions regarding the number of houses without AAA fittings that will be sold in the Sydney area, the proportion of these that are assumed to be gas and the savings per customer assumed.

### 2.5.1 Number of houses subject to the regulations which are sold

AGLGN initially assessed the number of homes which are likely to be sold from 1 July 2007 to 30 June 2010 by using estimates from ISF that the number of homes sold over the past few years is 6.3% of the total housing stock in NSW. MMA did not have any objections about the methodology but understood that the proportion proposed by AGLGN included sale of new houses which are already covered by Basix. According to information received from the Housing Industry Association (HIA):

"Total numbers of dwellings sold in NSW for 2003/04 were 153,894 and of that we state that 43,800 were new homes."<sup>6</sup>

While the advice on the number of new homes sold was consistent between HIA and ISF, it appears from the HIA information that only some 72% of the houses sold in 2003/04 were existing homes. If we assume that this trend continues, then the proportion of

<sup>5</sup>

NSW Government, Meeting the challenges, Securing Sydney's water future", Metropolitan Water Plan, 2004 page 18.

<sup>6</sup>

K Lewis, Housing Industry Association, personal communication dated 24 March 2005.

existing homes that are sold is estimated to be about 4.5% instead of 6.3%.

**After the draft MMA review AGLGN confirmed that the data did include new home sales which are already subject to Basix. AGLGN proposed using a 5-year average number of 4.7%, slightly higher than the 1-year average of 4.5% recommended by MMA. MMA considers this reasonable.**

## 2.5.2 Homes which already have efficient showerheads

AGLGN has assumed that at the start of 2005 1.3 M houses have not had retrofits. While MMA considered this estimate of un-retrofitted houses to be reasonable, it did not believe that this is the appropriate number to use in calculating the impact of sales of houses. There are more houses with water efficient showerheads than those which have had retrofits. According to the Australian Bureau of Statistics (ABS), about 43% of homes in NSW had water efficient showerheads in March 2004<sup>7</sup>. This is 1.1 M houses out of the 2.6 M in NSW. This suggests that 700,000 of the 1.6 M Sydney water customers already have water efficient showerheads.

Given that water efficient showerheads are by far the most important contributor to the requirement for water efficient housing, MMA believed that the penetration rate of efficient showerheads should be used in the calculation – although some consideration might be given to the fact that not all those the showerheads claimed to be water efficient will necessarily be AAA standard.

AGLGN has responded that ISF considers the ABS data on the penetration of AAA to not be correct.

“ In discussions with the ISF, they considered the ABS data (March 2004) on the penetration of AAA to be not correct. ISF base this on work that they have done in conjunction with SWC, and that have found that any information based on the consumers knowledge on whether they have a water efficient shower head to be doubtful. Their conclusion is that the lack of labelling on these devices is the cause of this error. Recent work that ISF have done with SWC have had people with experience/knowledge check the showerheads and have found the penetration rate of water saving devices to be much lower than those based on consumer knowledge. The penetration rate for AAA showerheads utilised by ISF reflects this fact.

AGL has used the figure quoted by the ISF of 1.34m homes that do not have AAA showerheads. This is not an assumption, but an estimate derived from ISF work with SWC.<sup>8</sup>”

MMA has no objection to the ISF estimate that the number of un-retrofitted homes in the

<sup>7</sup> Australian Bureau of Statistics (ABS), “Environmental issues, people’s views and practices”, Publication 4602.0, March 2004

<sup>8</sup> AGLGN response to the MMA draft report.

Sydney region is 1.34 M<sup>9</sup>.

MMA has also indicated in its draft report that the ABS survey may not accurately reflect AAA showerhead penetration as the survey question related to reduced flow showerheads, which are not necessarily AAA. MMA also agrees that the lack of adequate labelling on showerheads may make responses to such a survey somewhat uncertain.

Nevertheless, MMA is of the opinion that it cannot be assumed that only people who have been retrofitted over the past five years have reduced flow showerheads – in essence the assumption being made by AGLGN. Clearly there have been, and continue to be, sales of AAA showerheads to homes apart from for retrofits.

For example, a 1997 report by Ellis and White to SEDA, based on a survey of manufacturers, distributors and retailers estimated that sales of AAA showerheads made up about 30% of total annual showerhead sales in NSW<sup>10</sup>. This was at a time when there were virtually no retrofits.

MMA continues to consider it unreasonable to assume that only recently retrofitted houses have water efficient showerheads. However, MMA also does not consider it reasonable to assume that none of the households who stated in the ABS survey that they had flow reduced showerheads will benefit from any retrofit on sale of their houses.

MMA considers it reasonable to expect that the impact will lie between that expected if 1.34 M of homes do not have AAA devices (AGLGN assumption) and that if 43% (ABS estimate) already have AAA devices (0.9 M homes). Use of a mid-point estimate (1.1 M homes without AAA devices in 2004/05) will reduce the savings expected by AGLGN by about 11 TJ pa in each of 2008, 2009 and 2010, acting cumulatively.

**MMA considers that the starting estimate of houses without AAA devices should be set at 1.1 M in 2004/05.**

### 2.5.3 Proportion of homes

AGLGN has estimated that the proportion of homes which were affected by the Sydney Water Plan is 37.2%. In the draft report MMA stated that it considered this proportion to be too low as it underestimates the proportion of gas customers in Sydney and Wollongong which are likely to be impacted by the changes<sup>11</sup>.

AGLGN has pointed out that this proportion relates not to the proportion of residents taking gas, but to the lower proportion using gas for hot water. MMA has accepted the proportion proposed by AGLGN.

<sup>9</sup> SWC has about 1.5 – 1.6 M customers. If there have been 0.25 M retrofits over the past five years this means that the number of un-retrofitted homes is about 1.3 M.

<sup>10</sup> M Ellis and S White, Final report of a scoping study to SEDA, "The water efficient shower market in NSW", 1 December 1997 page 8.

<sup>11</sup> If the MMA comments had been taken into account the energy savings would have increased and AGLGN demand forecasts reduced.

### 2.5.4 Timing

In its draft report MMA commented that this program will start in July 2007, but as house sales are progressive during the year presumably only half the impact on energy usage will be felt in that year. This reduces the expected energy savings in the year 2007/08, but not thereafter.

AGLGN has commented that while MMA is technically correct with the statement in the above paragraph, this is not consistent with the simplifying assumption adopted by AGLGN in this AA and elsewhere accepted by MMA. Examples of this include the hot water replacement scheme, the approach for the project area of Singleton, (in fact all market expansion activities) where additional load during the year was assumed to be consumed load from the first year on connection. AGL believes that a consistent approach should be adopted and that its methodology in this light is reasonable. (Alternatively the forecast load should be reduced to reflect this adjustment through all demand forecasts).

AGLGN is correct that in the earlier review did not take into account timing issues such as this. MMA considers it reasonable to continue this practice for the update.

### 2.5.5 Savings per affected customer

AGLGN has assumed that the saving per customer for retrofitted house is 2.93 GJ, the same as in Section 2.3. As stated in that Section we understand this to be based on the 19% savings from retrofit applied to the average continuous usage for detached dwellings which are not supplied with Central Hot Water (CHW).

While MMA considers the savings per non-CHW house to be reasonable, it must be recognised that a reasonable proportion of dwelling sales is of units with central hot water. For these the savings is expected to be less than for the non-CHW houses. The savings here may be only 19% of 8.7 GJ (the average continuous use in units with centralised services).

In the draft report MMA considered that the savings per dwelling from house sales should take into account the fact that the savings in dwellings with CHW units is likely to be less than 2.93 GJ and take into account the expected proportion of such dwellings of total sales.

AGLGN has commented that its modelling already takes into account the standing and consumed energy components for water heaters. The savings achieved are only against the consumed energy component and that it believes the position stated to be reasonable.

MMA has reviewed the models previously supplied by AGLGN. In the models AGLGN has used the following assumptions about hot water appliance usage:

- Detached dwelling, storage high efficiency 19.6 GJ, storage standard efficiency 25.2 GJ

- Detached dwelling, continuous, 15.4 GJ
- Medium density, continuous 8.7 GJ
- Medium density centralised 18.3 GJ

Prior to the draft decision MMA and AGLGN had agreed that the savings attributable to detached houses was in proportion to the energy used in continuous systems as shown in the excerpt from Section 4.8.1 of the final report.

“AGLGN has estimated that the energy saved in continuous hot water systems will be in proportion to the total hot water used overall and that the absolute amount saved in storage systems will be the same as that saved in continuous. This eliminates the need for calculation of standing energy. These appear to be reasonable assumptions “

Thus, the savings for detached homes can be estimated as 19% (ISF number for retrofits) x 15.4 GJ = 2.93 GJ. We assume this is how the 2.93 GJ savings used by AGLGN has been estimated. MMA considers this to be a reasonable estimate of the savings achievable on the sale of existing non-CHW houses.

However, this does not apply to sales of units with Central Hot Water. Here the savings are likely to be significantly less. Using the same procedure, the savings should be only  $19\% \times 8.7 \text{ GJ} = 1.7 \text{ GJ}$  for the proportion of sales which have CHW<sup>12</sup>.

We estimate that some 20% of sales will be units with CHW. Taking this into account will increase sales by 5 TJ pa, cumulative in 2008, 2009 and 2010.

**MMA considers that the savings per dwelling from house sales should take into account the fact that the savings in dwellings with CHW units is likely to be less than 2.93 GJ and take into account the expected proportion of such dwellings of total sales.**

## 2.6 Basix assumptions

According to AGLGN, review of its assumptions by ISF has resulted in expected savings from applying Basix to new houses being reduced from 29% to 23%. This is in line with the letter seen by MMA, although the full report by ISF has not been provided.

In its initial updated analysis AGLGN reduced its assumed energy savings from Basix from 28.6% to 23% in line with the recommendations from ISF. The impact of the changed assumption appears to have been factored in as required.

However, MMA commented that the implementation date for Basix for multi-unit dwellings was changed from February 2005 to July 2005. In 2004/05 only Sydney single-

<sup>12</sup> Note that this is unlike the situation applying with Basix for new houses. There AGLGN has argued that the design of new multi units will be impacted reducing both continuous use and standing losses. This is not the case for sales of existing houses.

residential dwellings will be affected by Basix. This will have an impact which was not initially factored in by AGLGN.

AGLGN has accepted this, stating that the changes to Basix timing occurred after the AGLGN submission. In its revised updates AGLGN has reduced demand by 46 TJ from 2005. MMA cannot quite follow the AGLGN methodology in doing this and understands the demand reduction used by AGLGN to be a little high although the difference is relatively small.

However, MMA has also raised the issue that there is likely to be a significant delay, estimated to be 12 months, between planning approval requiring Basix and actual construction and use of multi-residential units (see MMA water report<sup>13</sup> to IPART page 32). This also needs to be factored into the analysis. Thus we would expect virtually no impact of Basix on multi-residential units in 2004/05 because they would all be under construction. Factoring in construction delay is expected to have about the same impact as the above delay in the introduction of Basix (around 40 TJ in 2005/06).

Note that this is a delay in applicability rather than a phasing issue. AGLGN has not included the impact of phasing here and MMA accepts this to be reasonable (see Section 2.5.4).

**AGLGN appears to have factored in the changes recommended by ISF and delay in introduction of Basix for multi-residential units. However it should also factor in a further construction delay of 12 months on the impact of Basix on multi-residential units.**

## 2.7 Summary

The forecast tariff market set out in the draft decision and the latest revised version by AGLGN are provided in Table 2.2.

**Table 2.2: AGLGN's revised demand forecasts (6 April 2005) and those in the draft decision**

		2005/06	2006/07	2007/08	2008/09	2009/10
<b>Draft Decision</b>						
Tariff market load, TJ	Residential	22975	23999	25039	26094	27168
	Business	11109	11159	11166	11213	11262
<b>AGLGN 6 April 2005</b>						

<sup>13</sup> McLennan Magasanik Associates Final Report to IPART, "Review of consumption forecasts. NSW metropolitan water agencies", December 21 2004, available at [www.ipart.nsw.gov.au](http://www.ipart.nsw.gov.au).

Tariff market load, TJ	Residential	22980	23974	25034	26109	27204
	Business	11109	11159	11166	11213	11262

Source: AGLGN, Draft Decision page 39

As can be seen there are now very limited differences between the most recent AGLGN forecasts and those included in the draft decision.

MMA considers that the AGLGN revisions can be considered best estimates arrived at on a reasonable basis in every area apart from three:

- The amount of house sales to which retrofit to meet Basix will apply from 2008
- The average savings in multi-unit houses after Basix on house sales is applied
- The impact of the delay between planning and construction for multi-residential units.

Altogether these are expected to increase sales by a total of a further 100 TJ or so by 2010.

### 3 MDQ Changes

The Tribunal has required that the MDQs forecast by AGLGN (see Chapter 1 above) be amended to take into account the actual levels of MDQ contracted by major customers in 2002/03. The main customers of concern are BHP Port Kembla, Shell and HCE Extractions/Caltex.

AGLGN has provided its most recent forecasts of ACQ and MDQ. These are provided in

**Table 3.1: Table 6.2 AGLGN's revised demand forecasts (June 2004)**

		2005/06	2006/07	2007/08	2008/09	2009/10
<b>AGLGN 29 March 2005</b>						
Contract market load, TJ	Total ACQ	65000	66238	66230	66369	66608
	Total MDQ	296.1	296.8	297.7	298.4	299.1
<b>Draft Decision (prior to amendment 8)</b>						
Contract market load, TJ	Total ACQ	65000	66238	66230	66369	66608
	Total MDQ	278.9	279.5	280.5	281.2	281.8

AGLGN has added about 17.2 TJ to its MDQ in each year. This is a little more than the difference between the MDQs for the majors as a whole in 2002/03 and 2003/04. It is a little less than the difference for the key majors mentioned above.

MMA considers the updated aggregate MDQ forecasts provided by AGLGN to be reasonable and in compliance with Amendment 8 in the draft decision. MMA has not checked the allocation of these MDQs.