Multinet Gas Distribution Partnership
ABN 53 634 214 009

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Multinet Gas

www.multinetgas.com.au

David Young
Director Energy
Essential Services Commission
Level 37 / 2 Lonsdale Street Melbourne
Victoria, 3000

Submitted electronically to energy.submissions@esc.vic.gov.au
CC:

Dear David

RE: Unaccounted for gas benchmarks 2018 to 2022

1. Introduction

I write in relation to the following two matters:

(1) Our concerns around the Essential Services Commission's (Commission) process and timeframes for establishing the Unaccounted for Gas (UAFG) benchmarks for the period 1 January 2018 to 31 December 2022. The current UAFG benchmarks, set out in Schedule 1 of Part C of the Victorian Gas Distribution System Code (Code) are due to expire on 31 December 2017. The benchmarks are intended to be updated every five years in line with our access arrangement periods. The Commission is responsible for establishing the new benchmarks to apply for the 2018 to 2022 period in accordance with the change procedures in Schedule 4 of the Code; and

(2) Our views on establishing appropriate 2018 to 2022 UAFG benchmarks and the information that the Commission should consider in undertaking its review in order to set the benchmarks.

Each of these matters is discussed below.

2. Process for establishing new benchmarks

We are concerned with the Commission's approach to establishing the new benchmarks. In particular, the lateness of the decision making process. This is of significant concern to us given the material financial impact of unaccounted for gas calculated by Australian Energy Market Operator (AEMO) using benchmarks set by the Commission.

You will be aware that due to an administrative oversight by the Commission, it did not establish the 2013 to 2017 UAFG benchmarks in sufficient time for the Code to be amended until July 2013 to incorporate the new benchmarks. As a result, a Ministerial Order was made to extend the 2012 benchmarks until the Code was amended. The six month delay in implementing the new benchmarks resulted in us incurring significant financial

penalties that were not consistent with the scheme and that we would not have otherwise incurred if the Commission had established the new benchmarks in a timely manner.

We request that the Commission bring forward the milestones and timeframes for its review process and finalise the review as soon as possible so that the new benchmarks can be set well before 1 January 2018. Managing the financial impact of the UAFG benchmarks continues to be a significant issue for us and we therefore want to engage with the Commission on this issue as a matter of urgency. We consider that establishing a transparent, timely and consultative process for determining the 2018 to 2022 benchmarks is critical.

3. Submission on appropriate level of UAFG benchmarks

To assist the Commission commence the process for establishing the 2018 to 2022 UAFG benchmarks, please see attached our submission on the appropriate level of UAFG benchmarks and method for establishing the benchmarks. This is supported by an independent expert report from Asset Integrity Australasia Pty Ltd (AIA) which is also provided as an attachment to this submission.

4. Closing

Please do not hesitate to contact me on if you or your staff would like to discuss these matters further.

Yours sincerely

Andrew Schille
General Manager Regulation and Corporate Affairs

Multinet Gas – Establishing the 2018 to 2022 Unaccounted for Gas (UAFG) Class B Benchmarks

1. Introduction

The purpose of this submission is to set out our views on establishing the Unaccounted for Gas (UAFG) class B benchmarks for the period 1 January 2018 to 31 December 2022[1]. The current benchmarks, set out in Schedule 1 of Part C of the Victorian Gas Distribution System Code (Code), are due to expire on 31 December 2017. The Essential Services Commission of Victoria (Commission) is responsible for establishing new benchmarks to apply for the period 2018 to 2022, in line with our upcoming access arrangement period.

Establishing appropriate benchmarks is critical because under the Code the regulatory arrangements provide that if our actual volume of UAFG exceeds the benchmark then we are required to compensate the gas retailers for the UAFG in excess of the benchmarks and if the actual volume of UAFG is below the benchmark, then retailers are required to make a reconciliation payment to us. These reconciliation payments are made in accordance with the Australian Energy Market Operator (AEMO) established procedures for reconciling UAFG. The Commission considers that the benchmark and reconciliation process forms part of an "incentive" framework to encourage gas distributors to minimise the volume of UAFG within their control including by replacing deteriorating pipelines.

We consider that in order for the benchmarks and reconciliation payments to be an "incentive" scheme:

- The benchmarks must be set appropriately such that the risk under the scheme is symmetrical and does not simply result in on-going underperformance against the benchmarks. We consider that over the current and previous access arrangement periods, the benchmarks were set artificially low and there were no actions that we could have efficiently and prudently undertaken to meet the benchmarks. This has resulted in us paying material reconciliation payments to retailers. We consider that there is no benefit to consumers from this outcome, but merely higher profit margins for gas retailers; and
- We should not be exposed to the volatility of the wholesale gas spot market in calculating the reconciliation payments made under the scheme. The intent of the scheme is to incentivise us to minimise the volume of UAFG. Payments should therefore be calculated based on a pre-determined dollar value per gigajoule that ensures we are not exposed to changes in the wholesale gas spot market price over which we have no control. We consider that relying on the wholesale gas spot market price grossly distorts the incentive properties of the UAFG arrangements by introducing price risk that is beyond our reasonable control but that could materially penalise or reward us on a basis that is not consistent with our performance.

The above issues are discussed further in sections 2 and 3 below. We consider that if these are not addressed by the Commission for the purposes of the UAFG arrangements to apply to us in the 2018 to 2022 period, then the scheme will not meet the Revenue and Pricing Principles (RPP) set out in section 24(2) of the National Gas Law (NGL), which provides that:

> *A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in –*
>
> *a. providing reference services; and*
>
> *b. complying with a regulatory obligation or requirement or making a regulatory payment.*

[1] Class B customers use less than 250 TJ per annum and typically use medium to low pressure networks.

In establishing the 2018 to 2022 UAFG benchmarks the Commission must also have regard to its objectives set out in sections 8 and 8A of the *Essential Services Commission Act 2001* (ESC Act).

In particular, section 8 provides that the ESC must:

> *(1) In performing its functions and exercising its powers … promote the long term interests of Victorian consumers.*
>
> *(2) Without derogating from subsection (1), in performing its functions and exercising its powers in relation to essential services, the Commission must in seeking to achieve the objective specified in subsection (1) have regard to the price, quality and reliability of essential services*

Section 8A of the ESC Act further provides that the ESC must, in making decisions, have regard to the following matters:

> *(1) In seeking to achieve the objective specified in section 8, the Commission must have regard to the following matters to the extent that they are relevant in any particular case—*
>
> *(a) efficiency in the industry and incentives for long term investment;*
>
> *(b) the financial viability of the industry;*
>
> *(c) the degree of, and scope for, competition within the industry, including countervailing market power and information asymmetries;*
>
> *(d) the relevant health, safety, environmental and social legislation applying to the industry;*
>
> *(e) the benefits and costs of regulation (including externalities and the gains from competition and efficiency) for—*
>
> *(i) consumers and users of products or services (including low income and vulnerable consumers);*
>
> *(ii) regulated entities;*
>
> *(f) consistency in regulation between States and on a national basis;*
>
> *(g) any matters specified in the empowering instrument.*
>
> *(2) Without derogating from section 8 or subsection (1), the Commission must also when performing its functions and exercising its powers in relation to a regulated industry do so in a manner that the Commission considers best achieves any objectives specified in the empowering instrument.*

We consider that if the 2018 to 2022 UAFG benchmarks developed by the Commission do not satisfy the RPP under the NGL, then they will also not give effect to sections 8 and 8A of the ESC Act. In this case we request that the Commission:

- Amends our licence conditions to remove our obligations to comply with the UAFG reconciliation payments to retailers under the Code (preferred option); or else
- Adopts the methodology for setting class B UAFG benchmarks as set out in this submission and that the Australian Energy Regulator (AER) includes a pass through provision to ensure that we can recover the cost associated with price impact (as opposed to the volume impact) arising from using the wholesale gas spot price to calculate the reconciliation payments.

2. Basis for setting the benchmarks

As noted above, if the class B UAFG benchmarks are set artificially low, and there are no cost efficient or prudent actions that we could take to meet the benchmarks, then we will continue to consistently underperform against the benchmarks and will continue to incur penalties under the UAFG regulatory arrangements.

The key matter that the Commission should consider in setting the benchmarks is whether the risk under the scheme is symmetrical and does not simply result in on-going underperformance against the benchmarks. To this end, the Commission should have regard for the following:

(1) Our historical UAFG performance;

(2) The contributory elements of our UAFG;

(3) Whether our management of UAFG is in line with industry best practice; and

(4) The varying mains lengths and material compositions between the Victorian distributors that contribute to their UAFG in determining the methodology for setting the class B UAFG benchmarks.

We commissioned Asset Integrity Australasia Pty Ltd (AIA) to prepare an independent expert report focusing particularly on matters (2) to (4) above.

Each of these issues is addressed below.

2.1. Our historical UAFG performance

The current UAFG Class B customer benchmarks, for the 2013 to 2017 period, are 4.1 per cent per annum. The Commission derived these benchmarks based on a three year average of our actual UAFG from 2008 to 2010. The Commission also made a downward adjustment of 0.05 percentage points to the forecast base because it considered that we made a "windfall gain" by not replacing the approved volume of mains in the Commission's 2008 to 2012 Final Decision. In particular, the Commission stated that[2]:

> *…Multinet replaced less than half of the kilometres of pipes for which funding was previously approved by the Commission…*

It went on to state[3]::

> *The reduced expenditure (and kilometres) on mains replacement has resulted in a windfall gain to the two [Multinet and Envestra] GDBs. Consumers have paid gas prices reflective of the higher expenditure on replacement approved in the previous regulatory period, not the actual expenditure completed.*
>
> *Accordingly, the Commission will adjust the forecast base.*

Figure 1 below shows that over the period from 2013 our actual UAFG has been well above the 4.1 per cent for the Class B benchmark and therefore we have made significant reconciliation payments to retailers for the volume of UAFG above the benchmark. Figure 1 also shows that:

- We significantly underperformed against the benchmark in each year of the previous 2008 to 2012 access arrangement period and therefore made material reconciliation payments to retailers; and

[2] Essential Services Commission (Commission), Gas Distribution System Code Review of Unaccounted for Gas Benchmarks Final Decision June 2013 p.3

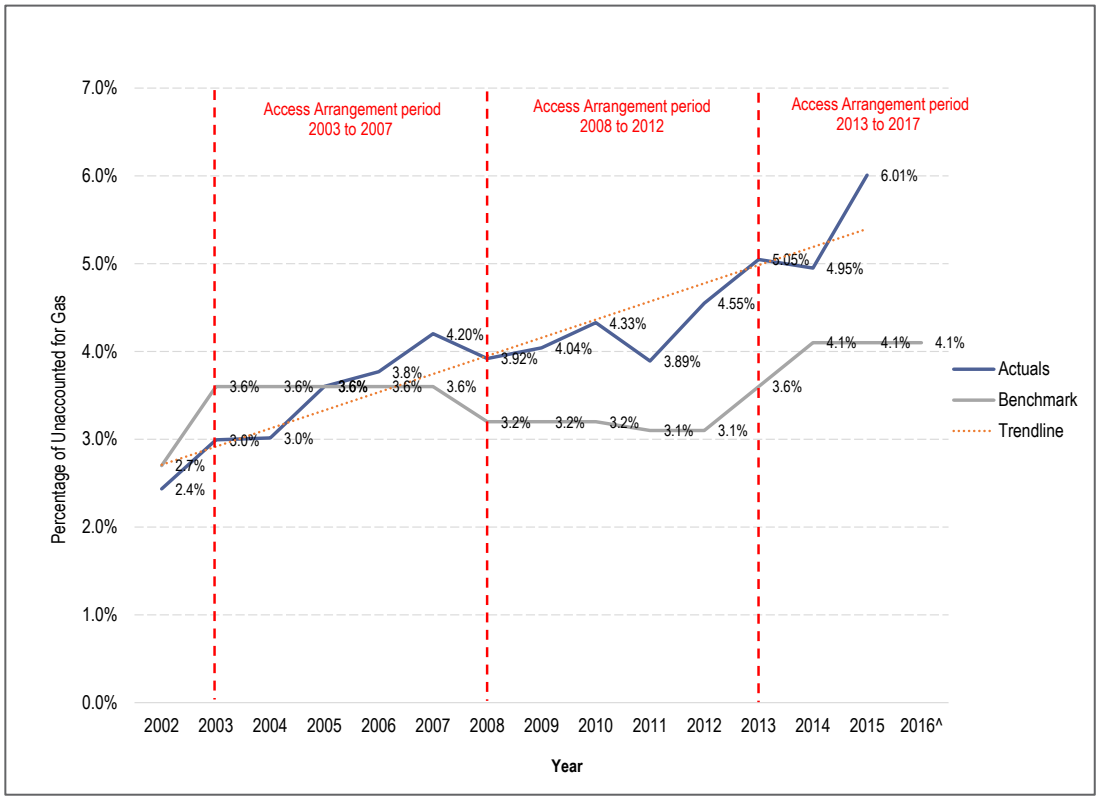
[3] Commission, Gas Distribution System Code Review of Unaccounted for Gas Benchmarks Final Decision June 2013 p.3

- Our UAFG has been steadily increasing since 2002 despite us taking all reasonable and appropriate measures to minimise UAFG as discussed in section 2.3 below.

The material difference between the benchmark and actual UAFG for Class B, as shown in Figure 1, demonstrates that we have faced strong financial incentives to take all efficient actions to minimise UAFG and therefore strongly suggests that the Commission's class B benchmarks were not set appropriately. In particular the Commission did not have appropriate regard for the varying mains lengths, ages, material compositions as well as other factors between the Victorian distributors that contribute to their UAFG.

We consider that this has important implications in light of the RPP in the NGL, which provide that we should be provided with a reasonable opportunity to recover at least the efficient costs that we incur in providing reference services and complying with our regulatory obligations. It also therefore has significant implications for the Commission's requirements to have regard to its objectives set out in sections 8 and 8A of the ESC Act.

Figure 1: Our actual UAFG performance and the ESC's benchmark from 2002 (per cent)



Note – the benchmark for 2013 is based on 6 months of 3.1 per cent and 6 months of 4.1 per cent

2.2. The contributory elements of our UAFG

UAFG is defined by the Victorian Wholesale Market Guide as the difference between metered injected gas supply and allocated gas at delivery points. Key factors contributing to UAFG include fugitive emissions (network leaks), billing correction factors (pressure and temperature), CTM uncertainty, metering errors, heating value error, billing and accounting errors, theft and other factors.

It is well accepted that actual UAFG is difficult to break into component parts due to the inherent uncertainty (compared to electricity) of metering a compressible fluid and the lack of data associated with determining physical unmetered losses.

We therefore engaged AIA to assess the contributory elements of our UAFG using the same principles that it applied in preparing its 2013 report, which we submitted to the Commission as part of its 2013 UAFG review process. AIA is an industry expert in UAFG and has applied its sophisticated understanding of the various drivers causing UAFG trends, including as arising from mains replacement, in order to assess the contributory elements of our 2015 UAFG. AIA's analysis is based on a single year (2015) but the analysis is representative of all years of the current access arrangement period.

Figure 2 below, shows AIA's assessment, in gigajoules, of the contributory elements of our total 2015 UAFG of 3,392 TJ together with the level of uncertainty AIA attributes to each element (shown as a vertical line). The contributory elements can be grouped into three main categories:

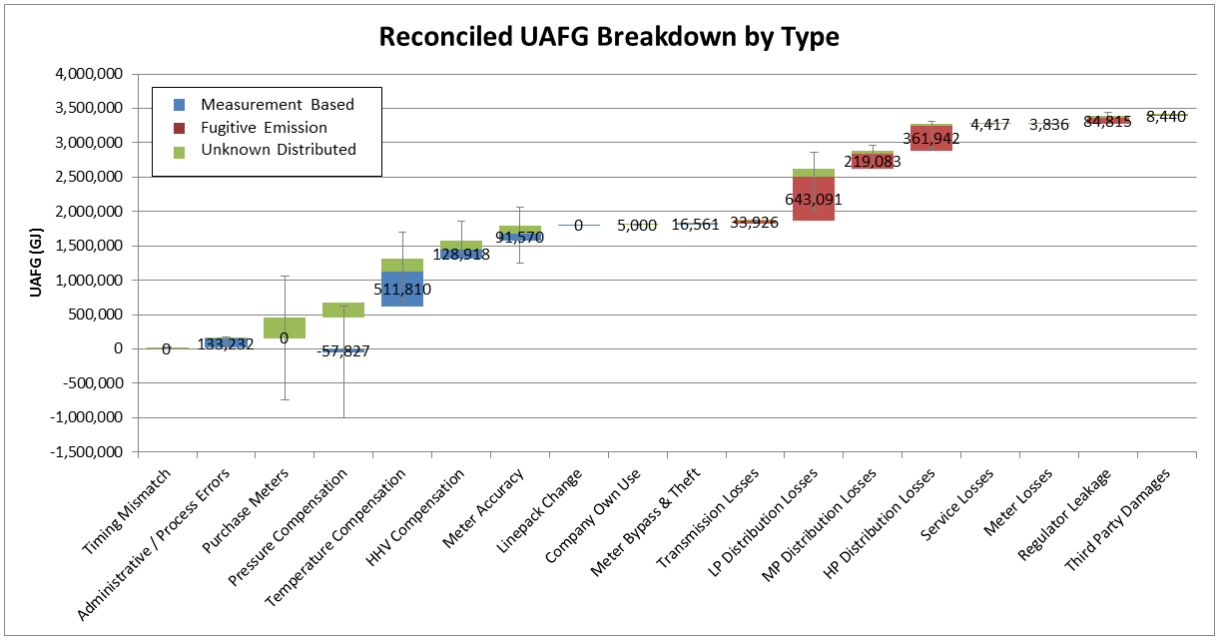
- Fugitive emissions (or leaks) - AIA has assessed total fugitive emissions (this includes the distribution of unknown UAFG to individual categories) to be 1,575 TJ[4] or 46.4 per cent. Of this AIA has determined that:
    - 758 TJ (22.3 per cent) is attributable to emissions from low pressure network;
    - 259 TJ (7.6 per cent) is attributable to emissions from the medium pressure network;
    - 386 TJ (11.4 per cent) is attributable to emissions from the high pressure network; and
    - 172 TJ (5.2 per cent) is attributable to other fugitive factors such as transmission network leaks, regulator leaks and meter leaks.
- Measurement based UAFG – AIA has assessed total net measurement based UAFG to be 1,818 TJ[5] or 53.6 per cent (this includes the distribution of unknown UAFG to individual categories). The key driver of measurement factors is temperature compensation which involves gas being delivered to Tariff V customers on the LP network at a lower temperature than assumed in the gas bill. This means that tariff V customers are delivered more energy than they pay for and hence it is a major contributor to temperature related UAFG, which is assessed to be 698 TJ of UAFG per year as shown in Figure 2.
- Unknown causes – AIA has assessed total unknown causes of emissions, being emissions that are not readily directly attributable to any individual UAFG element, to be 1,201 TJ (35.4%). These have been attributed to fugitive and measurement based UAFG in line with their individual uncertainty shown as a vertical line.

AIA's report, provided as an attachment to this submission, provides further details on the contributory elements of our UAFG.

[4] 2015 fugitive UAFG emissions are 1,360 TJ of on a directly attributable basis i.e. before the allocation of unknown emissions to individual UAFG categories.

[5] 2015 measurement based UAFG are 832 TJ of on a directly attributable basis i.e. before the allocation of unknown emissions to individual UAFG categories.

Figure 2: AIA assessment of contributory elements of our UAFG - with Unknown UAFG distributed



AIA has assessed that fugitive emissions, which comprises 46.4 per cent of our 2015 UAFG, is the key driver of our UAFG performance above the base level of the Victorian gas distributors and the primary cause of our steadily increasing UAFG since 2002, as shown in Figure 2 above. (*Fugitive emissions are denoted by the red bars*).

This explains our significantly higher levels of UAFG compared to other Victorian gas distributors because we have the largest low pressure network, as well as the largest population of cast iron and unprotected steel, to replace[6]. At the end of 2015[7]:

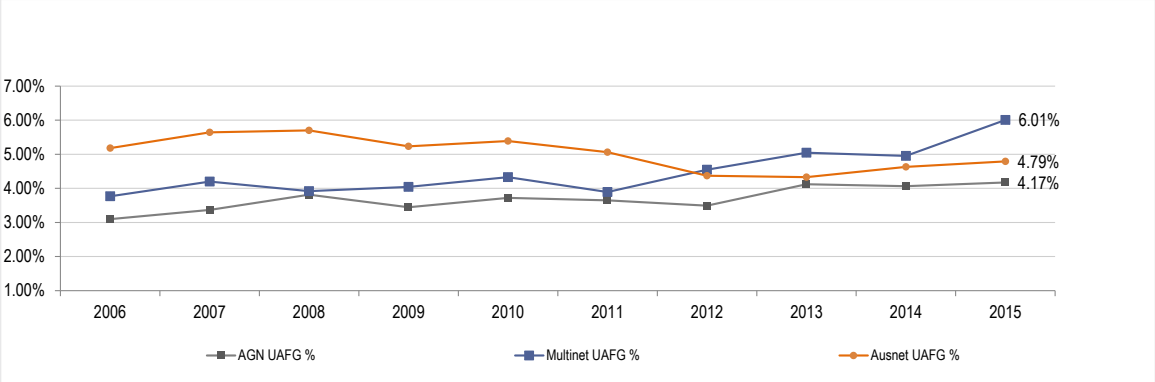
- We have 2,228 kilometres of LP mains including 1,268 kilometres of cast iron and unprotected steel remaining;
- AusNet Services has 801 kilometres of LP mains including 340 kilometres of cast iron and unprotected steel remaining; and
- AGN has 464 kilometres of LP mains including 214 kilometres of cast iron and unprotected steel remaining.

AIA concludes that our longer length of LP mains, cast iron and unprotected steel, and the associated higher leakage rates with these assets, is the key driver of the divergence between our UAFG (from 2011) and the UAFG levels experienced by the other two Victorian gas distributors that have similar assets and UAFG sources in all regards except for the length of LP cast iron and unprotected steel. This divergence is shown in Figure 3 below, which also shows that in 2015, AusNet and AGN's Class B UAFG levels were 4.79 per cent and 4.17 per cent respectively, compared to 6 per cent for Multinet.

[6] Our LP to HP Mains Replacement program is based on a 30-year initiative, which commenced in 2003 and is scheduled to be completed by 2033. The AER accepted and endorsed the basis for this initiative in, amongst other place places, its September 2015 decision on our mains replacement cost pass-through for the current access arrangement period.

[7] Victorian gas distributors 2018 to 2022 Reset RIN data, December 2016

Figure 3: Class B UAFG (%) Comparison between Victorian gas distributors



We agree with the AIA report that if the impact on UAFG arising from LP, cast iron and unprotected steel is removed then we will have a Class B UAFG of 4.21 per cent in 2015 which is in line with the other two Victorian gas distributors. In particular, the AIA report states[8]:

> *AIA considers that if all Multinet's LP and MP networks are replaced with HP then Multinet will have a Class B UAFG of 4.21% by 2033 which is line with the level of UAFG experienced by the other Victorian gas DB's who now have minimal cast iron networks remaining.*

Accordingly, the continued replacement of cast-iron and unprotected steel in the LP and MP networks with current generation HP polyethylene mains should continue to be the focus of our replacement program as they have high leakage rates per kilometre. The other fugitive emission elements are relatively low and are at a level expected in similar networks.

Consistent with AIA's recommendations, we have prioritised the completion of our mains replacement program. In particular, we:

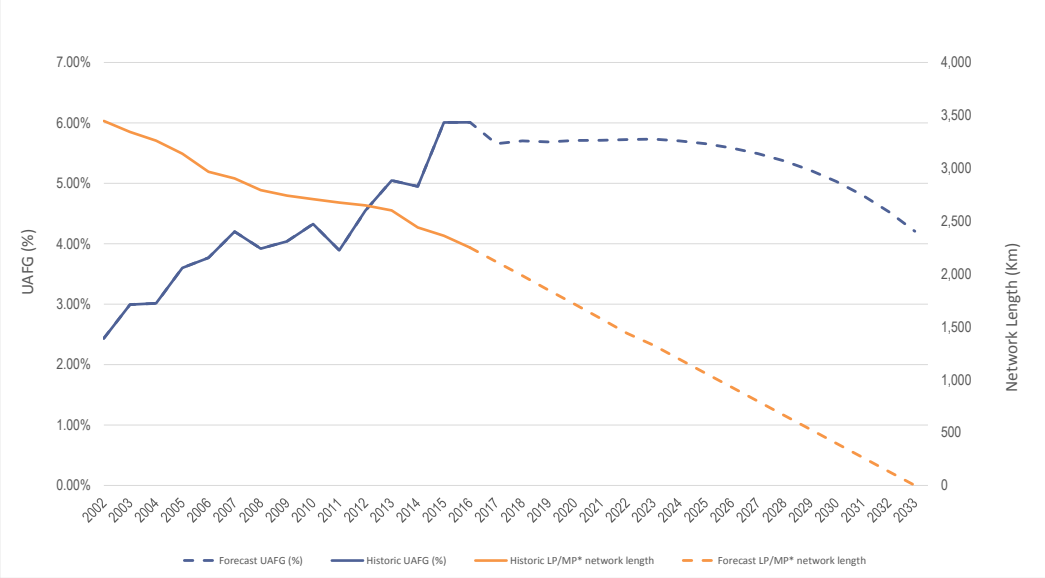
- Expect to replace 527 kilometres of LP with HP mains over the current 2013 to 2017 access arrangement period which is more than double the AER's original forecast. Our proposed increased volumes ensures that our LP to HP Mains Replacement program remains on track for completion by 2033;
- Propose, in our 2018 to 2022 Access Arrangement proposal submitted to the AER in December 2016, to undertake a further 625 kilometres of LP to HP mains replacement in the next access arrangement period. This is consistent with completing the 30 year replacement program by 2033;
- Propose, in our 2018 to 2022 Access Arrangement proposal, to replace 24 kilometres of MP cast iron mains. This is consistent with AIA's recommendation[9] "*to maximise UAFG reduction, these cast iron, PVC and unprotected steel mains should be targeted for replacement, especially, where economic, in the MP network*".

Our proposed Mains Replacement program for the 2018 to 2022 period comprises more than 50 per cent of our total capex program. We consider the AER's approval of our 2018 to 2022 Mains Replacement program is critical to managing our UAFG and bringing our fugitive emissions back in line with other distributors.

[8] AIA Review of Multinet Gas' Unaccounted for Gas, 2017, p. 31
[9] AIA Review of Multinet Gas' Unaccounted for Gas, 2017, p. 16

Importantly, however, as shown in Figure 4 the net leakage from our distribution network will not decrease in direct proportion to the length of cast-iron pipes that are replaced. This is because there is increased leakage from the remaining cast iron pipes which offsets the leakage benefits until the "turning-point" has been reached. After this point, there is a clear decrease in UAFG emissions. Figure 4 shows that we expect this "turning-point" to occur in around 2023.

Figure 4: Expected UAFG with mains replacement



AIA describes this as follows[10]:

> *[There will be] A slight increase in Class B UAFG levels from 2017 until 2023 (5.72%) due to the deterioration rate of the remaining cast iron and unprotected steel being greater than the replacement rate, after which it decreases down to 4.21% by 2033 once Multinet has completed its mains replacement program.*
>
> *This is in line with actual UAFG for other Victorian gas distributors, who have a small amount of cast iron mains left in their network.*

[10] AIA Review of Multinet Gas' Unaccounted for Gas, 2017, p. 43

2.3. Management of UAFG

AIA has reviewed our practices and policies for managing UAFG and considers they are robust and in-line with best industry practice. There were three key aspects of AIA's review being:

- Reviewing our current strategies, policies and procedures for managing UAFG against industry best practice;
- Assessing how we have responded to and addressed the recommendations in AIA's 2013 report to improve our management of UAFG; and
- Assessing the initiatives, identified by our in-house team of engineers, to reduce UAFG particularly relating to Industrial and Commercial customers as they make up 30 per cent of the network throughput.

Based on its assessment of the above, AIA concluded that our strategies, policies and procedures are in line with best practices. AIA found that:[11]

- *Multinet's UAFG management practices and policies are in line with industry best practice. AIA considers that Multinet has maintained its UAFG at efficient and economically prudent levels over the 2013 to 2017 period given the nature of its network;*
- *Multinet has addressed all of the recommendations set out in AIA's 2013 report*
- *there are no additional cost effective actions available to Multinet that would effectively reduce the current effective Class B UAFG level of 6.0%.*

The full details of AIA's review are set out in chapter 6 of AIA's 2017 Report.

2.4. The basis for setting the class B UAFG benchmarks

We support AIA's recommendation that consistent with the approach adopted by the Commission to determine the 2013 to 2017 benchmarks, a three year average based on our actual UAFG remains appropriate to determine the launch point (forecast UAFG level for 2017) for the 2018 to 2022 UAFG benchmarks. We consider that the Commission should use the most recently available and validated data to determine the launch point being 2014 to 2016 – because the most recently available information is the best and most accurate information available.

We also support AIA's recommendation that:

> *It is critical that the methodology adopted by the Commission to set the 2018 to 2022 benchmarks recognise the significantly higher proportion of cast iron and unprotected steel in Multinet's network compared to AusNet and AGN who have nearly replaced all of these assets. This is because these material have highest leakage rates and AIA consider that coupled with an ongoing deterioration of these assets are driving Multinet's increasing UAFG;*

To this end, we propose to adjust the launch point of 5.66 per cent (derived based on a three year average from 2014 to 2016) with an annual "deterioration rate", which recognises the impact of expected future leakage from the remaining cast iron pipes that are yet to be replaced. This deterioration rate has been calculated to be 8 per cent per annum based on leak survey data in 2010 compared to leaks in 2015. The

[11] AIA Review of Multinet Gas' Unaccounted for Gas, 2017, p. 26

deterioration rate provides a reasonable estimate of the expected increase in UAFG from the LP mains that are yet to be replaced.

Appendix 6 of AIA's report provides further details about the calculation of the deterioration rate. Importantly, AIA's report states that[12]:

> *If this deterioration rate was applied to the Commission's cast iron leakage rate agreed in 2008, then the current leakage rates would be around 70% higher (425GJ/km/yr) which would account for much of Multinet's increasing UAFG level. This higher leakage rate has been applied in the UAFG model as it best rationalises the higher levels of UAFG in Multinet. This would have a much lower impact on the other Victorian DB's levels of UAFG as they have a much lower population of cast iron.*

The deterioration rate is only applied to the fugitive emissions component of UAFG attributable to LP and MP Cast Iron and Unprotected Steel networks.

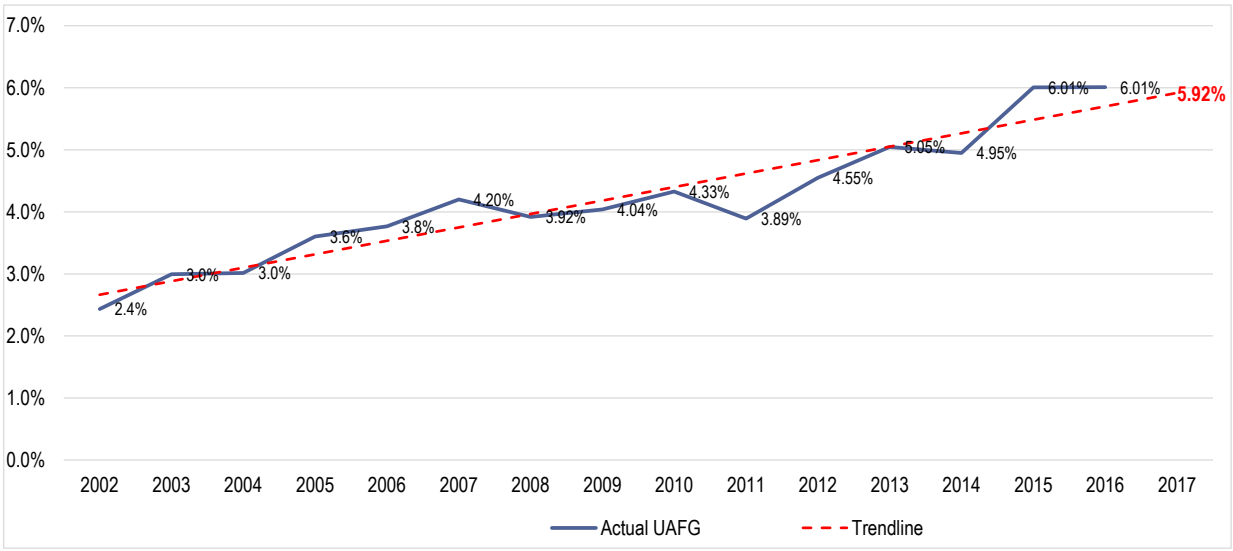
The UAFG benchmarks derived using the above approach are set out in the Table 1 below:

Table 1 Proposed Class B UAFG 2018 to 2022 benchmarks – per cent (based on three year average)

	2018	2019	2020	2021	2022
Annual UAFG benchmarks %	**5.70**	**5.69**	**5.71**	**5.71**	**5.72**

We have validated the proposed benchmarks in Table 1 above using trend analysis (linear line of best fit) over the period 2002 to 2016. This is shown in Figure 5 below.

Figure 5: Trend line (line of best fit) 2002 to 2015 actual Class B UAFG



The 2017 launch point derived using trend analysis is 5.92 per cent, which is 0.26 per cent higher than the launch point derived using the three year trend methodology. The correlation of the line of best fit with the data is very high, with a strong R^2 of 0.8965.

[12] AIA Review of Multinet Gas' Unaccounted for Gas, 2017, p. 14

Applying the deterioration rate to this launch point derives the following benchmarks set out in Table 2 below.

Table 2 Proposed Class B UAFG 2018 to 2022 benchmarks – per cent (based on trend – line of best fit)

	2018	2019	2020	2021	2022
Annual UAFG benchmarks %	**5.97%**	**5.98%**	**6.01%**	**6.01%**	**6.02%**

The benchmarks derived using trend analysis are consistently higher, albeit in line with those derived using a three year average approach. This supports the continued use of the three year average provided a deterioration rate is also applied, as a reasonable and appropriate method for establishing the 2018 to 2022 benchmarks.

3. Basis for calculating the reconciliation payments Changes in the AEMO reconciliation process

As noted in section 1 above, the intent of the UAFG incentive scheme is to incentivise us to minimise the volume of UAFG from our network. Incentive payments under the scheme should therefore be calculated based on a pre-determined dollar value per gigajoule that ensures we are not exposed to changes in the wholesale gas spot market price over which we have no control.

Rule 317 of the National Gas Rules (Rules) requires AEMO to make distribution UAFG procedures which set out how AEMO will calculate unaccounted for gas and the basis on which it will determine the payments to be made for that gas between gas distributors and retailers.

AEMO has published the Wholesale Market Distribution Unaccounted for Gas Procedures (UAFG Procedures) which require us to make Reconciliation Payments, being amounts calculated in accordance with Schedule 1 of Part C of the Code. That amount depends upon a number of terms, including "X" which is defined as:

> *'X=the quantity annual price of Gas, using spot and contract prices and quantities, as determined by AEMO for the previous calendar year expressed in $ per gigajoule;'*

As set out in our 30 October 2015 submission to AEMO in relation to the "*AEMO Impact and Implementation Report – Wholesale Market Distribution Unaccounted for Gas Procedures (UAFG Procedures),* we consider that AEMO cannot redefine "X" to use a 100 per cent average volume weighted market price (AVWMP) in the UAFG Procedures.

We do not support the use of the AVWMP as we do not use spot and contract prices. The AVWMP introduces more price volatility, over which we have no control and therefore grossly distorts the incentive properties of the UAFG arrangements by introducing price risk that is beyond our reasonable control but that could materially penalise or reward us on a basis that is not consistent with our performance.

As discussed above, we do not support the continuation of a UAFG incentive scheme whereby the reconciliation payments are calculated using AVWMP and consider that the Commission should:

- Amend our licence conditions to remove our obligations to comply with the UAFG reconciliation payments to retailers under the Code (preferred option); or else
- Adopt the methodology for setting class B UAFG benchmarks as set out in this submission and the AER to include a pass through provision to ensure that we can recover the cost associated with price impact (as opposed to the volume impact) arising from using the wholesale gas spot price to calculate the reconciliation payments.

Model INPUTS

Class B Actual UAFG	%	GJ	
2014	4.95%	2,535,911	
2015	6.01%	3,392,597	
2016	6.01%	-	*Preliminary data shows 2016 UAFG at about 6%, use 2015 value for analysis*

Network lengths (km)			
Network	**2015**	**2016**	*2015 values are as per AIA report*
Low Pressure	2,254	**2,141**	*CI (55%), UPS (9.8%), protected Steel (5.3%), PVC (28%), PE (14%)*
Medium Pressure - CI / UPS	108	**108**	*CI (35%), UPS (65%)*
Medium Pressure - Other	790	**790**	*Protected steel (64%), PE (36%)*
High Pressure	6,795	**6,964**	*Protected steel (39%), PE (61%)*

Source: SAP

AIA 2015 Attributed UAFG			
Network	**GJ/km/yr**	**%**	
Low Pressure	757,785	22.3%	*LP is not split as CI/UPS makes up 97% of leakage for LP*
MP	259,022	7.6%	
Medium Pressure - CI / UPS	**242,704**	**7.1%**	*CI/UPS makes up 93.7% of leakage for MP*
Medium Pressure - Other	**16,318**	**0.5%**	*Other makes up 6.3% of leakage for MP*
High Pressure	385,644	11.4%	

Source: AIA Report, 2015 breakdown

Replacement rates (km p.a.)						
		As per submission to AER for next regulatory period				
Network	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Low Pressure	128.0	126.4	127.7	127.8	135.4	107.4
Medium Pressure - CI / UPS	4.8	10.2	5.5	8.1	3.0	**5.4**

Source: Distribution Mains Strategy (MG-SP-0009)

HP growth (km/p.a.)	56.5	*Length HP network has grown minus pipework's. Take the average of the last 2 years (2016, 2015)*

Source: Estimate from ESV reporting on network lengths

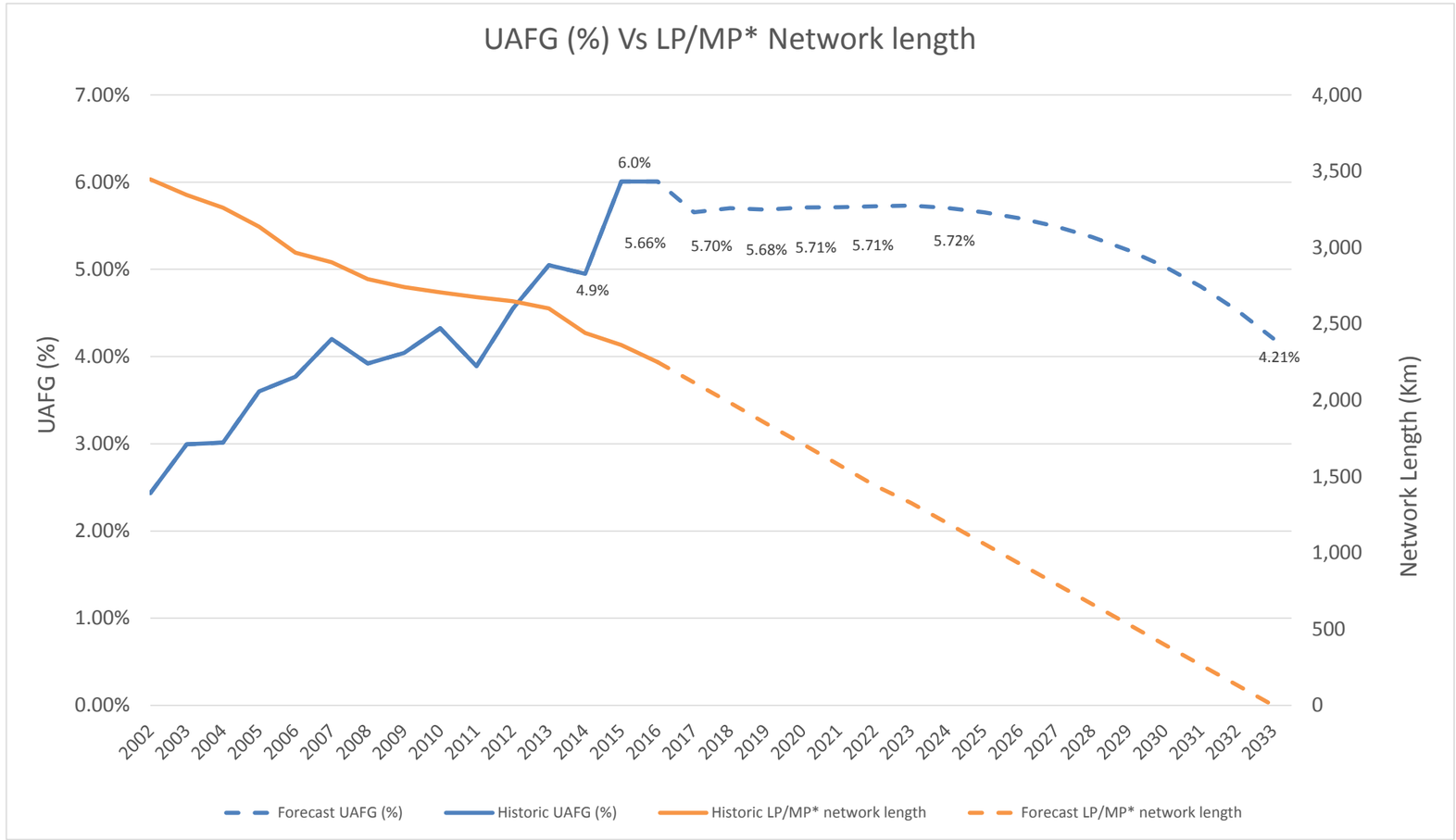
Deterioration rates (%)		*Applied only to CI/UPS*
Low Pressure	8.0%	*Based on leakage survey on MP CI from 2011-2015*
Medium Pressure - CI / UPS	**8.0%**	*Same deterioration rate as LP*
Medium Pressure - Other	0.10%	*Minor / variable*
High Pressure	**0.10%**	*Same deterioration rate as MP - Other*

Source: Estimate from GN

Model OUTPUTS

2017 Launch point (3 yr avg)	5.66%	*3 year average (2014-2016)*	
Peak point	5.73%	in	2023
End point	4.21%		

	2018	2019	2020	2021	2022	**Average**
Proposed benchmark (3 yr avg)	5.70%	5.68%	5.71%	5.71%	5.72%	5.71%



Note:

*MP network length displayed is only length of cast Iron and UPS as this is the material with the highest leakage rates

Review of Multinet Gas' Unaccounted for Gas

Table of Contents

AIA REPORT ON MULTINET UAFG

1 EXECUTIVE SUMMARY

Multinet Gas (Multinet) commissioned Asset Integrity Australasia Pty Ltd (AIA) to:

- Undertake an assessment of the contributory elements of its Unaccounted for Gas (UAFG) in 2015;
- Identify any changes in the drivers of UAFG since AIA's last assessment;
- Review the appropriateness, in terms of industry best practice, of the actions and processes undertaken by Multinet to minimise UAFG including by reviewing how it has actioned the key recommendations in AIA's 2013 report; and
- Recommend a method for calculating the Class B UAFG benchmarks set out in Schedule 1, Part C of the Gas Distribution System Code (Code) for the 2018 to 2022 period.

Multinet's current benchmarks, set out in Schedule 1 of Part C of the Victorian Gas Distribution System Code (Code), were set by the Essential Services Commission (Commission) for the 2013 to 2017 period. The Benchmarks are intended to be updated every five years in line with access arrangement periods. The next access arrangement period commences on 1 January 2018 and the Commission is responsible for establishing the new UAFG benchmarks for this period.

Multinet's current UAFG Benchmarks are 0.3% for Class A and 4.1% for the Class B customers. The current class B benchmarks were derived based on a three year average of actual Class B UAFG from 2008 to 2010 with a downward adjustment of 0.05 percentage points to recognise Multinet's underspend against the Commission's mains replacement allowance for the 2008 to 2012 period.

The benchmarks are important because if the actual volume of UAFG exceeds the benchmark then Multinet is required to compensate the gas retailers for the UAFG in excess of the benchmarks and if the actual volume of UAFG is below the benchmark, then retailers are required to make a reconciliation payment to Multinet. These reconciliation payments are made in accordance with the Australian Energy Market Operator (AEMO) established procedures for reconciling UAFG.

Over the current period, Multinet's actual volumes of UAFG have been in excess of the benchmarks and therefore Multinet has been required to pay retailers. This is consistent with Multinet's UAFG outcomes since 2002 which have been steadily increasing over the period (refer to Figure 1). This increasing trend is despite Multinet taking all reasonable and appropriate measures to minimise UAFG including setting up a dedicated in-house team to identify the causes of this increase and to develop mitigating measures.

This report is intended to provide an expert view on the best method for determining class B UAFG benchmarks for the 2018 to 2022 period based on analysis of the drivers of UAFG for Multinet and its management of UAFG over the period.

As detailed in this report, based on our analysis, we consider that there are no additional cost effective actions available to Multinet that would effectively reduce its effective Class B UAFG level of 6.0 per cent.

1.1 SUMMARY OF FINDINGS

In 2015, Multinet's total UAFG was 3,392 terajoules (TJ). AIA has assessed that:

- 2,192 TJ was directly attributed to individual UAFG categories as defined by AIA. In particular:
  - 1,360 TJ are directly attributable to fugitive UAFG emissions; and
  - 832 TJ are directly attributable to measurement based UAFG.
- 1,201 TJ was "unknown", meaning it has not been attributed to an identifiable cause. AIA has distributed the "unknown" portion of UAFG to individual categories in line with AIA's assessment of the uncertainty of each category.

Based on its detailed review and modelling of Multinet's 2015 UAFG, AIA concludes that:

- The overriding driver of Multinet's increasing UAFG levels is its longer lengths of cast iron and unprotected steel mains compared to the other two Victorian gas Distribution Networks (DBs), coupled with increased leakage rates due to ongoing network deterioration of the low pressure (LP) and medium pressure (MP) cast iron and unprotected steel network, which was assessed to be 8% per annum.
- Other factors have influenced the increases in Multinet's UAFG over the current period, include:
  - Potential systematic uncertainty in the Custody Transfer Meters (CTM);
  - Lower flow weighted network temperatures;
  - The higher level of the network average Higher Heating Value (HHV) than the declared state-wide average; and
  - The ongoing connection of customers to the High Pressure (HP) network.
- Multinet's UAFG management and policies are robust and in-line with best industry practice.
- There are no additional cost effective actions that Multinet could have undertaken to reduce its Class B UAFG level below 6.0% over the current period.
- Multinet should continue with its replacement of cast iron, PVC and unprotected steel mains in the forthcoming 2018 to 2022 access arrangement period.

AIA in conjunction with Multinet, has developed a model that forecasts expected UAFG levels over the period 2017 to 2033. This model assumes that:

- All LP and all MP cast iron and unprotected steel mains are replaced with HP by 2033. This is consistent with Multinet's Mains Replacement program set out in its 2018 to 2022 Access Arrangement proposal to the Australian Energy Regulator (AER); and
- All other UAFG sources remain constant.

- An 8% deterioration rate is applied to the remaining cast iron and unprotected steel mains until programmed for replacement. This deterioration rate has been derived from leakage survey analysis on MP cast iron (refer to Appendix 6).

The model forecasts:

- A decline in Multinet's class B UAFG from 6.01% per cent to 4.21% by 2033 once Multinet has completed its mains replacement program. This is in line with actual UAFG for other Victorian gas distributors, who have a smaller amount of cast iron mains left in their network. The model therefore supports the finding that Multinet's longer length of cast iron network and associated higher leakage rates provides a rational explanation for the divergence between its UAFG (from 2011) and the UAFG levels experienced by the other Victorian gas DB's that have similar assets and UAFG sources in all regards except for the length of LP and MP cast iron; and
- A class B benchmark for 2018-2022 period, as set out in Table 1 below. These are calculated based on a three year average of actual UAFG from 2014 to 2016 adjusted for an 8% deterioration rate to LP and MP mains.

Table 1 Recommended annual class B UAFG benchmarks for 2018 to 2022

	2018	2019	2020	2021	2022
Per cent (%)	5.70	5.69	5.71	5.71	5.72

2 CONTEXT AND BACKGROUND OF UAFG

2.1 WHAT IS UAFG

UAFG is defined by the Victorian Wholesale Market Guide as the difference between metered injected gas supply and allocated gas at delivery points.

UAFG comprises gas losses, metering uncertainty, gas temperature and pressure at variance from that assumed at billing, heating value inaccuracy, , and other factors detailed below.

UAFG is difficult to break into component parts due to the inherent uncertainty (compared to electricity) of metering a compressible fluid and the lack of data associated with determining physical unmetered losses.

UAFG is becoming increasingly important worldwide, particularly in deregulated markets, as the cost impacts have to be allocated between shippers and transporters.

2.2 PURPOSE OF THIS REPORT

Multinet Gas commissioned AIA to:

- Undertake an assessment of the contributory elements of its Unaccounted for Gas (UAFG) in 2015;
- Identify any changes in the drivers of UAFG since AIA's last assessment of UAFG;
- Review the appropriateness, in terms of industry best practice, of the actions and processes undertaken by Multinet to minimise UAFG including by reviewing how it has actioned the key recommendations in AIA's 2013 report; and
- Recommend the method for calculating the Class B benchmarks set out in Schedule 1, Part C of the Gas Distribution System Code (Code) for the 2018 to 2022 period.

2.3 SOURCES AND UNCERTAINTY OF UAFG

AIA has assessed the contributory elements of UAFG in Multinet's networks using the same principles applied in our earlier reports for Multinet and other gas distributors.

The contributory elements of UAFG are classified as either Measurement UAFG or Fugitive Emission - which arise from network leakage.

Measurement UAFG elements include:

i. Purchase Meters – CTM uncertainty

ii. Meter Accuracy – Industrial, Commercial and domestic meter uncertainty

iii. Temperature Compensation - gas delivered at variation to Standard Conditions

iv. HHV Compensation – gas delivered at variation to declared HHV

v. Administrative errors – pressure settings at variance to that assumed for billing

vi. Timing mismatch – estimated meter readings at start and end of the UAFG year.

vii. Pressure Compensation – gas delivered at variation to Standard Conditions

viii. Linepack Changes – Linepack volume varies each year (new mains)

ix. Company Own Use – gas used for operational reasons

x. Meter Bypass & Theft

Fugitive Emission UAFG elements include:

i. LP, MP and HP Distribution losses - varies with material and pressure

ii. Transmission Pipelines losses – varies with material and pressure

iii. Service losses – varies with material and pressure

iv. Meter Losses – joint leakage

v. Regulator leakage – control system bleeds to atmosphere

vi. Third Party Damage – losses to atmosphere

This separation into measurement based and fugitive UAFG allows AIA to assess UAFG separately.

AIA's model has assessed the contribution from each of the above elements to Multinet's total actual 2015[1] UAFG. The output from this model is shown in a stacked chart format (refer to Figure 3) to readily identify the relative contribution of each component.

Inevitably the assessed level of UAFG does not match the total UAFG level measured and there will generally be an "unknown" amount of UAFG that is not readily directly attributable. The model attributes this "unknown" amount in accordance with the level of uncertainty that AIA considers appropriate for each element (refer to Figure 4).

For example, the CTM measurement of injections into a network usually have a directly attributable UAFG assessment of zero (unless data shows otherwise). However, each meter has an uncertainty of up to +/- 3 per cent, and as a group of meters the total uncertainty may be up to +/- 1.0 per cent. As the CTMs measure total injections, any systematic bias will have a major impact on UAFG, and hence has a relatively high level of uncertainty in its contribution to UAFG. In contrast to this, the uncertainty of other UAFG elements, such as leakage from the transmission network, will be relatively low due to the high integrity of these assets.

To better understand the complexity of UAFG and focus on those areas that have the greatest impact, AIA has drilled further into these categories in Table 2. This analysis illustrates the inherent uncertainty in measuring and managing UAFG. A clear understanding of these key drivers is necessary to assist in informing the management of UAFG, subject to undertaking the necessary analysis in conjunction with the AEMO Industry Reference Group.

It should be noted that the impact of any initiative to reduce UAFG will lag the investment and there are inherent difficulties in justifying the investment as the anticipated theoretical reduction in UAFG is by no means guaranteed.

[1] 2015 actual UAFG was the latest data available to AIA when compiling this report.

2.4 Assessment of Key UAFG Components

Table 2 – Detailed assessment of key drivers of UAFG

Component	Description
Purchase Meters – CTM Uncertainty	CTM's have a zero-direct assessment of UAFG as there is no direct evidence indicating otherwise, but they have an energy measurement uncertainty of up to +/- 3.0 per cent of throughput when maintained correctly. For the large CTMs a small systematic error can have a large impact on uncertainty on UAFG. A systematic 1.0 per cent error in CTM readings would contribute approximately 18 per cent of all of Multinet's UAFG. Multinet has a planned CTM replacement program to ensure that its meters are operating within design limitations. The Victorian Market Rules set out the requirements for CTM accuracy and the requirements for CTM calibration. The CTM's to Multinet's territory are owned, operated and calibrated by APA Gasnet. APA Gasnet is obligated to carry out calibration in accordance with contracts established at privatization and based on the Wholesale Market Rules. Multinet receives regular confirmation from APA Gasnet that all the CTM's are operating and maintained to the required standards. APA Gasnet look to maintain uncertainty within +/- 1.0% and when uncertainty is found outside this range then remedial action is recommended to bring the uncertainty back to +/- 1.0%. However, the APA Gasnet calibration is undertaken only at the flows prevalent at the time of calibration not at the full range of flows experienced by the CTM. A recent APA Gasnet report indicated immediate or short term upgrades or replacement are required on 11 of Multinets CTMs. The main reason is the prudent lifecycle replacement after 20 years of operation. Additionally sonic nozzles have been fitted to turbine meters to reduce the risk of over ranging and meter damage from short duration surges at failsafe events, however some risk remains. Coriolis meters are chosen to replace turbine meters as there is no risk of damage from surges in flow.
Meter Accuracy - Large Tariff D Customer uncertainty	As with CTMs, meter uncertainty with large Tariff D customers has a large effect on the total level of UAFG due to the high volumes involved with Tariff D customers (> 10TJ p.a.). Meter accuracy limits are set out in the Gas Distribution System Code and Multinet's meter replacement programs are compliant with these requirements.
Temperature Compensation	The temperature assumption for basic meter customers introduces an error that will increase UAFG when the temperature at the meter is below 15 degrees C, especially in the winter months on networks downstream of large Pressure Reduction Stations (PRS's) where the pressure cut reduces the gas temperature. One important element of this source of UAFG is that it is more pronounced for customers directly supplied from HP networks where a further pressure cut is immediately upstream of the meter. Therefore, the ongoing connection of customers to HP networks (including due to mains replacement) is increasing temperature related UAFG gradually on an annual basis.

Component	Description
HHV(Higher Heating Value) Compensation	The differential in average HHV between Multinet and the declared State-wide value appears to be stable over the last few years and Multinet receives a greater proportion of the higher HHV gas than the State average. This adverse impact on Multinet is a significant contributor to UAFG. The generation of data on HHV values in Multinet's region over the coming years should feed into the AEMO Industry Reference Group to review the current methodology in setting a state wide HHV prior to future GAAR reviews.
Administrative errors - I&C Pressure Set Point	An assessment of a small sample of I&C supplies indicated the average pressure set point was higher than that assumed in metering. This caused a decrease in the energy that should be billed to the customer causing an adverse impact on Multinet's UAFG.
LP, MP & HP distribution Losses	The largest individual contributor of UAFG is distribution losses on LP Mains due to the population of cast iron and unprotected steel. The continued replacement of cast iron, unprotected steel and PVC in the LP and MP networks, as planned by Multinet, should continue to be the focus for replacement. The UAFG estimate for HP mains is slowly increasing with its increasing population and is driven by a low leakage rate of high integrity PE and steel in the HP network but with increased weighting for higher pressure. Although the replacement of these distribution mains will reduce the fugitive emissions from the network, these reductions are counterbalanced by increases in UAFG from two other sources: a) The majority of mains replaced are from the LP network, and are usually replaced by a HP supply. This HP supply has to be reduced in pressure just before the meter, and the Joule Thomson affect from this pressure reduction causes cooling of the gas by approximately 2°C. This cooled gas delivered to the meter increases the UAFG by around 28 GJ /Km (based on a 2°C less than standard temperature and 68 customers per km of network). b) The remaining LP & MP network is subject to continuous deterioration with age. This can be demonstrated by an increase in fracture and leakage rates on cast iron over the past few years. Analysis of increased leaks identified by leakage survey indicates a deterioration rate of the cast iron network of around 8 per cent per year. Refer to appendix 6 for calculation of this deterioration rate.

2.5 Basis For the Commission's Determination of 2013 to 2017 Benchmarks

In its June 2013 Final Decision, the Commission set the 2013 to 2017 Class B UAFG benchmarks based on a three year average (2008-2010) with a downward adjustment of 0.05 percentage points to the base to recognise Multinet's underspend against the Commission's mains replacement allowance for the 2008 to 2012 period. This resulted in a Class benchmark of B 4.1%.

The Commission considered a three-year average (2008–10) would address the year on year variations in the weather. The Commission did not, however, make any adjustments to the UAFG targets for ongoing network deterioration or any other factors between the Victorian distributors that contribute to their UAFG.

2.6 AIA recommendations for assessing 2018 to 2022 Benchmarks

The year on year increase in UAFG over the 2013 to 2017 period (see Figure 1 below) indicates there are other factors than the weather, impacting Multinet's UAFG. In particular, AIA consider that the higher population of LP and MP networks in Multinet's Region relative to industry peers and the ongoing deterioration of the LP and MP networks is the key driver of Multinet's increasing UAFG.

When Multinet's replacement program achieves a similar low level of LP and MP cast iron assets (the driver of mains replacement), then AIA expects that Multinet's UAFG will be in line with the levels experienced by AusNet Services (AusNet) and Australian Gas Networks (AGN).

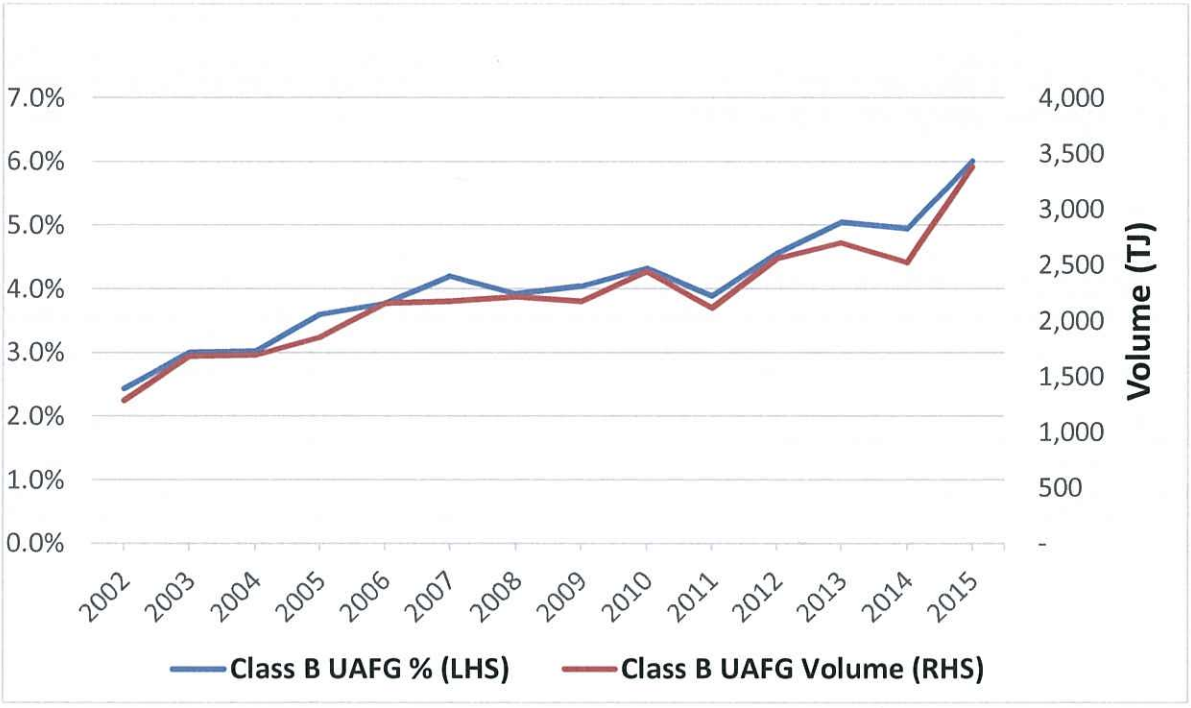
To this end, AIA considers that it is critical that the methodology adopted by the Commission to set the 2018 to 2022 benchmarks addresses this issue.

3 MULTINET'S HISTORICAL UAFG PERFORMANCE

3.1 MULTINET'S UAFG PERFORMANCE SINCE 2002

Figure 1 below shows Multinet's class B UAFG performance since 2002. This shows that Multinet's UAFG has been steadily increasing since 2002.

FIGURE 1 CLASS B UAFG PERFORMACE SINCE 2002



3.2 COMPARISON TO OTHER VICTORIAN GAS DISTRIBUTORS SINCE 2006

Figure 2 below compares Multinet's UAFG performance since 2006 with the performance of the other two Victorian gas DBs. Figure 2 shows that:

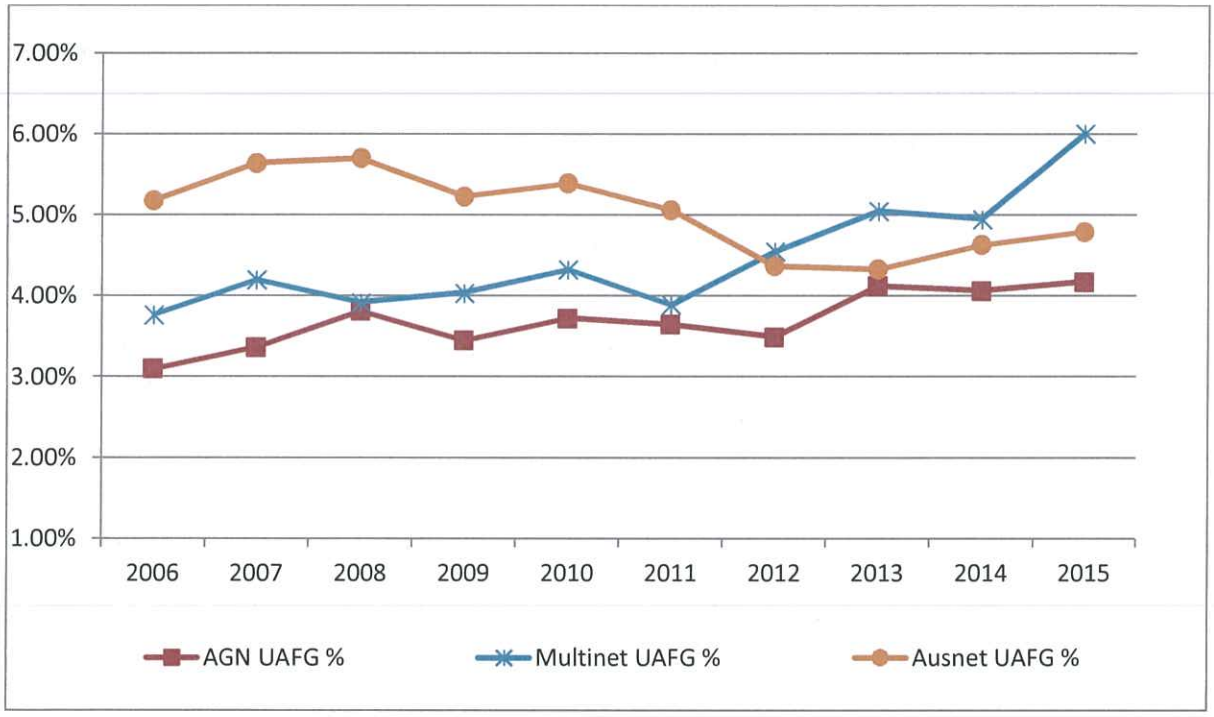
- 2011 is the turning point where the UAFG performance between the Victorian gas DBs changes.
- In 2015, AusNet and AGN's Class B UAFG levels were 4.79% and 4.17% respectively, compared to 6.01% for Multinet.

Given that the approach and practices for managing UAFG is similar between all of the Victorian gas DB's, AIA considers that that the change in UAFG performance from 2011 to 2015 is driven predominately by the lower population of cast iron and unprotected steel assets in AGN and AusNet compared to Multinet. As at 2015 the remaining levels of cast iron and unprotected steel assets on the LP network are as follows:

- 214km out of a Total Network length of 464km in AGN's network;
- 340km out of a Total Network length of 801km in AusNet's network; and
- 1,451km out of a Total Network length of 2228km in Multinet's network.

With their relatively minor population of cast iron and unprotected steel assets remaining, AGN and AusNet will not have the high leakage volumes experienced by Multinet.

FIGURE 2 CLASS B UAFG (%) COMPARISON BETWEEN OTHER VICTORIAN DB'S



4 COMPONENT ANALYSIS OF MULTINET'S UAFG

4.1 CLASSIFICATION OF UAFG SOURCES – CONTROLLABLE AND NON-CONTROLLABLE

As described in section 2.3 there are a number of sources of UAFG, some of which are within Multinet's control and some which are not. AIA has classified these sources as non-controllable and controllable in the sections below.

4.1.1 NON-CONTROLLABLE DRIVERS

- CTM Uncertainty
- Meter uncertainty
- Cast iron deterioration
- Weather variations
- Gas temperature in winter months
- Cooling effect from regulators supplying customers directly from the HP network
- HHV losses
- Transmission losses

- Line-pack change
- Service leakage
- Third Party damage
- Meter bypass and theft

4.1.2 CONTROLLABLE DRIVERS

- LP and MP Replacement program– focused on higher leakage rate cast iron assets and agreed with the AER
- Network pressures – continuously managed to minimise leakage
- Meter accuracy – Ensuring compliance with Australian Standard (AS) 4944:2006 for the time expired meter testing and replacement program. The specific Multinet program is approved by the AER
- Industrial and Commercial (I&C) pressure set point - This variation in metering pressure is the normal situation for all metered supplies, however the pressure profile for I&C customers is regularly checked and calibrated and when required, improved flow controls are implemented to minimise UAFG.

4.2 UAFG CONTRIBUTION BY ELEMENT CATEGORY – DIRECTLY ATTRIBUTED UAFG

AIA has assessed the individual contributions of Multinet's total 2015 UAFG by undertaking a detailed assessment of the network information provided by Multinet. The information reviewed by AIA as part of this assessment is listed in Appendix 2 of this report.

Figure 3 below, shows AIA's assessment of the contributory element of MG's total 2015 UAFG of 3,392 TJ. Figure 3 shows AIA's assessment of the UAFG level (in gigajoules (GJ)) for each UAFG component (components grouped under emissions, fugitive and unknown).

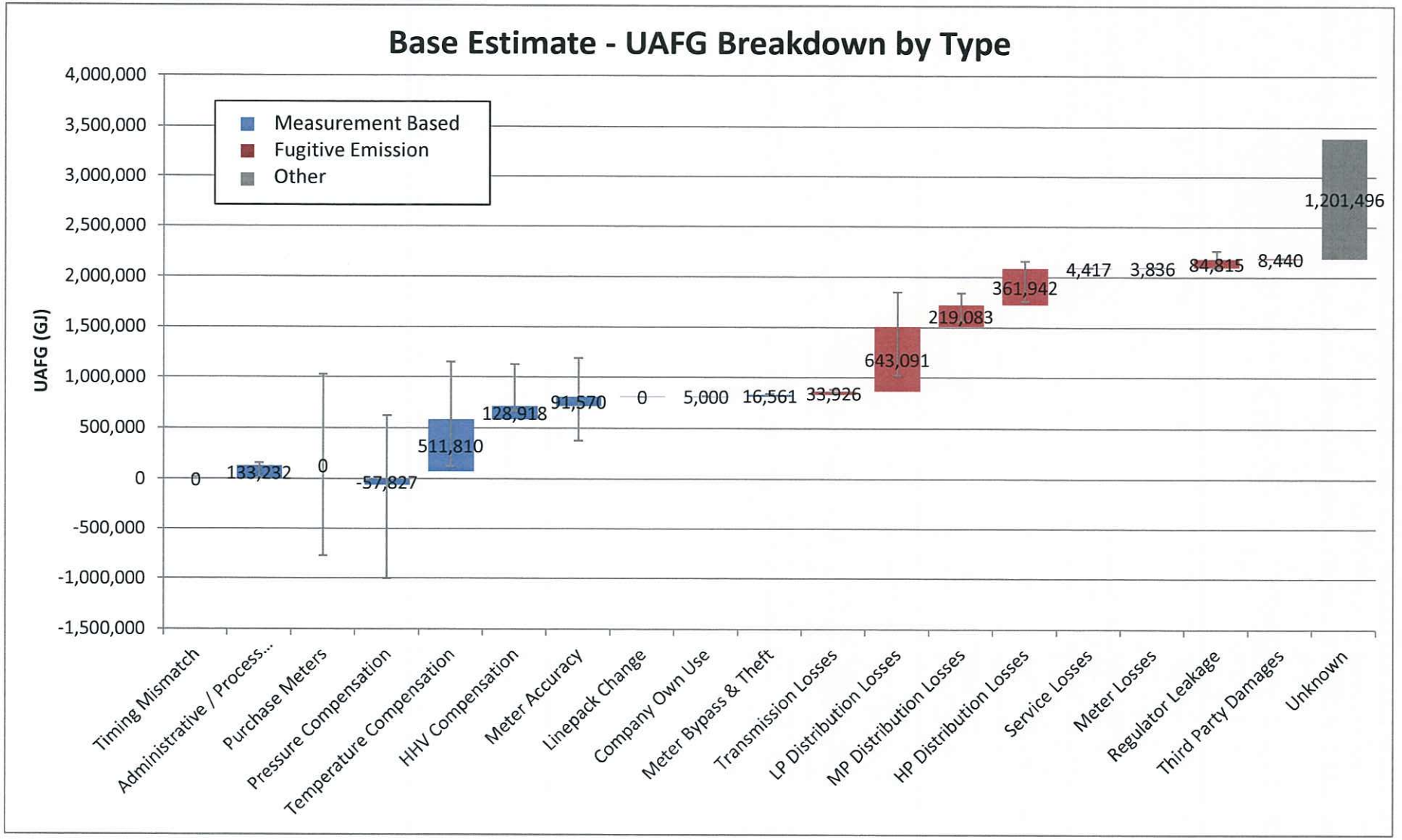
Some components, such as pressure compensation, may have the effect of reducing UAFG as the altitude effect can result in gas being supplied to customers being at a lower pressure than that assumed for customer billing. This "negative" UAFG reduces the cumulative UAFG on the stacked chart.

Multinet Gas have provided an analysis on leaks identified on the cast iron network between 2011 and 2015 which shows a deterioration rate of 8.7% per year on cast iron. AIA have reviewed this analysis on deterioration and agree the data indicates a deterioration of the cast iron of around 8% per year, the principal of which was previously recognized by the Commission, but due to lack of data was not assessed at this level. Appendix 6 of this report provides further details about the calculation of the deterioration rate.

If this 8% deterioration rate was applied to the Commission's cast iron leakage rate agreed in 2008 (250GJ/km/yr), then the current leakage rates would be around 70% higher (425GJ/km/yr) which would account for much of Multinet's increasing UAFG level. This higher leakage rate has been applied in the UAFG model as it best rationalises the higher levels of UAFG in Multinet. This has a much lower impact on the other Victorian DB's levels of UAFG as they have a much lower population of cast iron.

AIA assessed the total attributable 2015 UAFG (Measurement and Fugitive) for Multinet to be 2,191 TJ. This resulted in an "unknown" (not readily attributed to any individual UAFG element) UAFG of 1,201 TJ which is shown by the grey bar on the right-hand side of Figure 3.

Figure 3 - Stacked Chart by Component for 2015 UAFG



4.2.1 Assessment of Multinet's Fugitive Emissions

AIA has assessed Multinet's total Fugitive Emissions UAFG to be 1,360 TJ.

Figure 3 shows that the largest generic contributor to Multinet's UAFG continues to be leakage from the distribution network, especially the LP mains with its high population of the older cast iron and unprotected steel pipes that have high leakage rates.

To maximise UAFG reduction, AIA recommends that these cast iron, PVC and unprotected steel mains should be targeted for replacement especially where economic in the MP network. In AIA's opinion, Multinet should prioritise mains replacement to reduce UAFG but also to minimize the likelihood of pipes failing which may pose a safety risk to the public and property (if the failure is significant).

Even though the UAFG estimate for HP mains is driven by a low level of leakage rates for the PE and protected steel mains, the relatively long lengths and higher pressures of the HP network is gradually increasing the fugitive emissions with the increasing population of these assets. The continued replacement of cast iron, PVC and unprotected steel in the LP and MP networks should, as planned by Multinet Gas, continue to be the focus for replacement as they have high leakage rates per kilometer.

AIA found that other fugitive emission elements contributing to Multinet's UAFG are relatively low and are at a level expected in similar networks.

4.2.2 Assessment of Mutlinet's Measurement based UAFG

AIA has assessed Multinet's total net measurement based UAFG to be 832 TJ.

Figure 3 shows that the key component of Multinet's measurement based UAFG is temperature compensation (which AIA has assessed contribute 512 TJ to Multinet's UAFG per annum). This involves gas being delivered to Tariff V customers on the network at a lower temperature than assumed in the gas bill. In determining Multinet's UAFG contribution from temperature compensation, AIA used data across 16 of Multinet's I&C sites that have pressure and temperature monitoring to determine the average temperature across Multinet's network for the 2015 year. The flow weighted average temperature over the year was found to be 2.0° C less than the standard temperature of 15°C used in the billing calculation as set by AEMO.

Pressure reduction supplying gas to the distribution networks cools the gas and has been measured at peak times in the winter months (on Tariff D customers) to be delivered to customers as low as 5°C which is 10°C below the temperature assumed for billing of domestic customers. Supply to Tariff V customers at these low temperatures tends to be at times of greatest demand hence increasing the effect. This principal is further magnified for Tariff V customers supplied directly from the HP gas network where the pressure is further reduced just before the meter hence increasing the cooling effect.

The customers are therefore delivered more energy than they pay for and hence it is a major contributor to temperature related UAFG which is assessed to be 512 TJ of UAFG per year.

AIA found the other key drivers of Multinet's measurement based UAFG include:

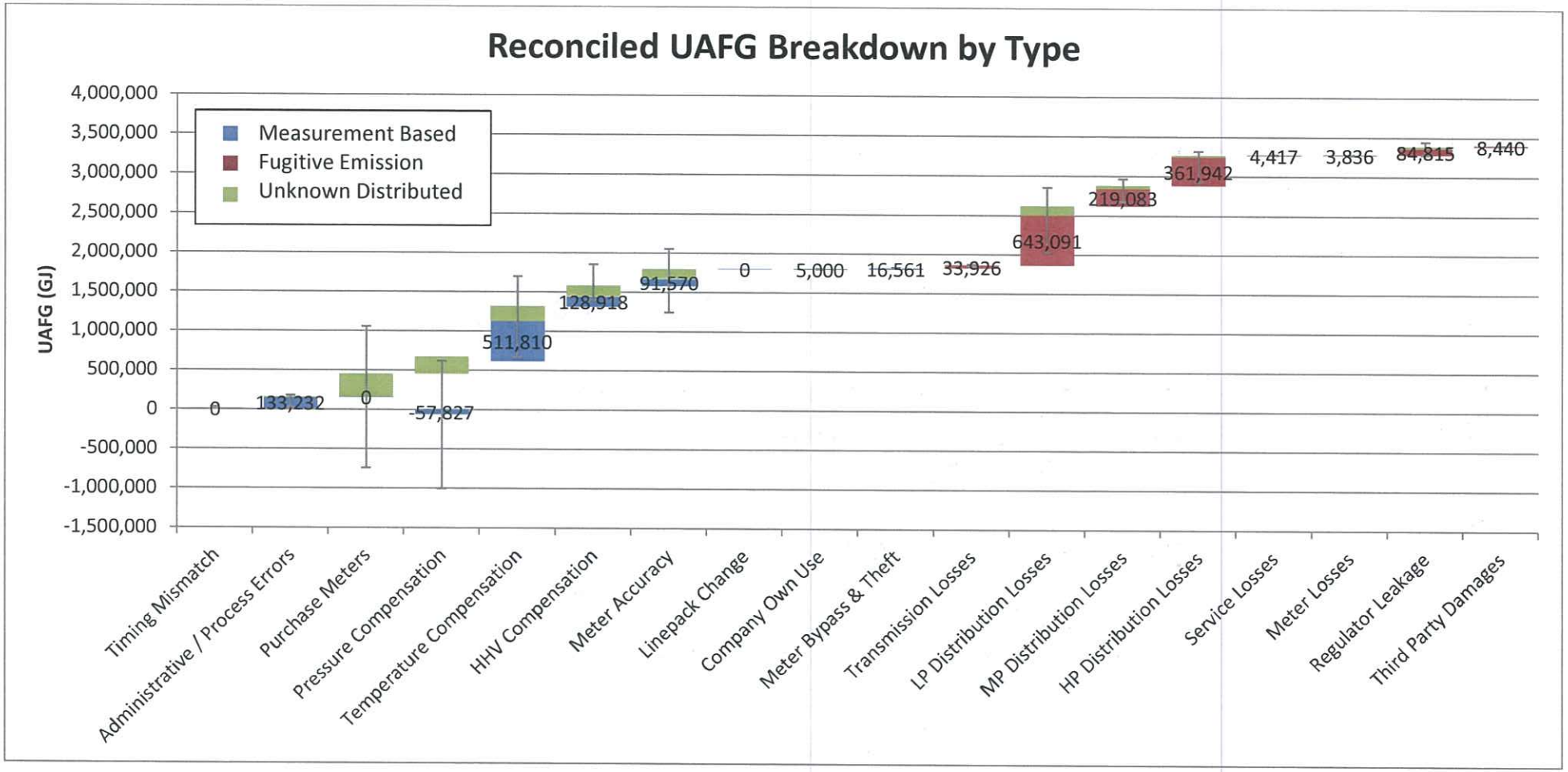
- **Administrative and Process UAFG** - based on an assessment of the variation of the pressure set point on I&C installations on eight I&C installations in Multinet's network, AIA found that the energy delivered was on average around 0.8% more than that billed to the customer due to the pressure at the meter being higher than that assumed for billing. AIA concludes that this has contributed to an adverse impact of 133 TJ of UAFG in 2015. Figure 3 shows this as Administrative and Process UAFG.
- **CTM measurement –** AIA has assessed CTM measurement based UAFG to be zero as there is no direct evidence indicating otherwise. However, individual CTM's have an uncertainty of up to +/- 3% of energy throughput, and as a systematic uncertainty of the total group this uncertainty could be in the order of up to +/- 1.0% of total throughput. Hence AIA has attributed a high level of uncertainty to CTM measurement as any systematic bias can contribute significantly to UAFG
- **Meter accuracy** – AIA assessed meter accuracy to contribute 92 TJ to Multinet's UAFG, generally as a consequence of meters operating at or over design capacity as meters tend to under-read at this level. These meters also have similar measurement uncertainty as the CTM's.
- **Pressure compensation -** The elevation of the network can have a negative contribution to UAFG as high elevations will reduce the pressure at the meter. AIA assessed that the average elevation of Multinet's network is around 44 metres, and therefore applied this in its assessment. AIA found that this results in a relatively small reduction in UAFG of 58 TJ as shown in Figure 3.
- **HVV Compensation** – AIA found that the calculations of the flow weighted HHV injections to Multinet compared with the flow weighted State Declared HHV indicates that there is 129 TJ of directly attributed UAFG from this source.
- **Line pack** - The impact of linepack changes including gassing up mains to new customers and replacement mains contributes 2 TJ of UAFG.

AIA found that other measurement based elements of UAFG have a relatively small contribution and are in line with levels expected in similar networks.

4.3 Distribution of Unknown UAFG

Figure 4 shows the "unknown" UAFG component of 1,201 TJ attributed to individual fugitive and emission based UAFG elements in line with their individual uncertainty (denoted by the vertical lines).

Figure 4 - Stacked Chart with Unknown UAFG Distributed to Individual Fugitive and Emission Based UAFG Elements



[redacted]

Table 3 SUMMARY OF DIRECTLY ATTRIBUTED AND DISTRIBUTED UAFG

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]		[redacted]	[redacted]	[redacted]

4.4 CHANGES IN UAFG DRIVERS SINCE 2008 TO 2012 REVIEW

Since undertaking its last report in 2013 (which was accepted by the Commission), AIA does not consider there has been any new UAFG drivers, however, the data reviewed in the current report indicates there is additional weighting to some drivers as follows:

- Deterioration of the cast iron network appears to at a year on year rate of 8% which was previously recognised but not assessed at this high level. If this deterioration was applied to the Commission's cast iron leakage rate agreed in 2008 the current leakage rates would be around 70% higher (425GJ/km/yr), which would account for much of Multinet's increasing UAFG levels. This would have a much lower impact on the other Victorian DB's as they have a much lower population of cast iron.
- Cold temperature effect – 2015 data indicated that average temperatures were 2°C less than the assumed 15°C in billing. In the winter months during high gas demand the gas temperatures were measured as low as 5°C.
- Pressure supplied to I&C customers has been assessed from a sample of I&C sites to be providing 0.8% more energy than billed due to compensation for regulator droop. This level of UAFG has likely always been there, but until the detailed work was done it was assumed to be much less.

AIA has assessed there to be minimal change in the "unknown" UAFG component since its 2013 review. This has been assessed to contribute 35% to Multinet's total UAFG compared to 36% in its 2013 report.

AIA emphasizes, that the high level of leakage from the LP and MP cast iron network accounts for Multinet's higher level of UAFG compared to the other Victorian gas DB's that have similar assets and UAFG sources in all regards except for the length of LP and MP cast iron. Historically, it explains the UAFG separation of Multinet's UAFG from the other DB's from around 2011. AIA consider that if all Multinet's LP and MP networks are replaced with HP then Multinet will have a Class B UAFG of 4.21% by 2033 which is line with the level of UAFG experienced by the other Victorian gas DB's who now have minimal lengths of cast iron and unprotected steel assets remaining in their networks.

5 MANAGEMENT OF UAFG

5.1 AIA'S 2013 REPORT RECOMMENDATIONS – IMPLEMENTATION ASSESSMENT

AIA's 2013 report for Multinet, sets out a number of recommendations for Multinet to better manage its UAFG over the 2013 to 2017 period.

As part of this report, AIA has assessed whether, and if so how, Multinet has responded to these recommendations. AIA confirms that Multinet has addressed all the recommendations set out in its 2013 report. A summary of the outcomes of AIA's review is set out below. Appendix 4 of this report provides further details on AIA's assessment of Multinet's response to each of the recommendations in the 2013 AIA report.

5.2 STEPS TAKEN BY MULTINET TO REDUCE UAFG

5.2.1 POLICIES & PROCEDURES

Multinet's current policies and procedures are designed to cost effectively minimise UAFG. AIA has reviewed Multinet's policies and procedures and can confirm that Multinet applies these in managing its network.

Appendix 1 of this report sets out a list of the documents that AIA has reviewed and their impact on the management of UAFG. The ongoing application of these policies and procedures ensures that Multinet is implementing the current best practice of UAFG management.

5.2.2 MAINS REPLACEMENT STRATEGIES

Multinet has a mains replacement strategy that was submitted to the AER together with its 2018 to 2022 Access Arrangement proposal. This strategy supports Multinet completing its mains replacement program by the year 2033.

The replacement of LP and MP cast iron and unprotected steel in Multinet's network is critical to reducing Multinet's UAFG as these materials have by far the highest leakage rates. The higher population of these assets in Multinet (1268km) compared to AusNet and AGN who have 340km and 214km left on the network respectively, is considered the major factor in Multinet's level of UAFG. This coupled with an ongoing deterioration of these assets is contributing to the increasing level of UAFG for Multinet.

5.2.3 UAFG CALCULATION AUDIT UNDERTAKEN BY AIA

In 2014, Multinet commissioned AIA to undertake a 2 week audit of the Multinet UAFG calculations to ensure they were compliant with AEMO procedures. AIA can confirm that the audit identified no non-compliances and an overview of the audit is shown in Appendix 3

5.2.4 UAFG PROJECT TEAM INITIATIVES

In 2015, Multinet set up an in-house team of engineers in an effort to address increasing UAFG levels. The team's primary focus were as follows:

- Identify reasons for increasing UAFG levels
- Identify areas where there is a potential to reduce UAFG
- Review the UAFG calculation

As a result of this investigation the team were able to develop the following initiatives:

- UAFG Settlement – Systems and data flow audit
- UAFG Settlement – Calculation Model Audit
- UAFG Settlement – Billing and Meter Data Integrity
- Recover lost gas from 3rd party damages
- Improve gas meter inventory control to prevent unbilled consumption
- Leakage Survey and Repair of Medium Pressure Cast Iron Mains
- Incorrect PCF for Customer Consumption
- Temperature and Pressure Correction for large I&C customers
- Reduce Network pressures
- Elimination of Estimated Reads (I&C Gas meters)
- Investigation of faulty dials on meters
- SAP MIRN enhancement for PCF matching

The team has focused heavily on the UAFG calculation as well as I&C customers as they make up 30% of the network throughput.

5.3 EFFICIENCY OF MANAGING UAFG 2013 TO 2017

Based on its assessment, AIA concludes that the observed increase in UAFG over the period is not the result of inefficiency. The following factors have influenced the recent increases in Class B UAFG up to 6.0% (for 2015):

- the ongoing deterioration of the LP and MP cast iron and unprotected steel network;
- the potential for systematic uncertainty in the CTMs;
- the supply of gas at pressures above that assumed at billing;
- the average HHV of the network being higher than the state-wide declared average;
- the ongoing expansion of the HP network (resulting in the lower temperature effect of customers directly connected to the HP network);

- the flow weighted average temperature of gas in the distribution network has been assessed at 13.0°C, with actual gas temperatures in the winter months falling to 5°C during high flow periods.

AIA agrees with the Commissions' views expressed in its June 2013 Final Decision on UAFG Benchmarks, that there are many factors that pull in opposite directions which affect the current levels of UAFG. AIA considers that there are no additional cost effective actions available to Multinet that would effectively reduce the current effective Class B UAFG level of 6.0%.

AIA also accepts that the Victorian gas DBs, as is the case in other jurisdictions, must ensure that any capital investment undertaken to reduce UAFG is prudent and efficient or it may be disallowed by the AER.

6 PROPOSED BASIS FOR ESTABLISHING 2018 TO 2022 BENCHMARKS

In conjunction with Multinet, AIA has developed a model that forecasts expected UAFG levels over the period 2017 to 2033. This model assumes that:

- All LP and all MP cast iron and unprotected steel is replaced with HP by 2033. This is consistent with Multinet's Mains Replacement program set out in its 2018 to 2022 Access Arrangement proposal to the AER; and
- All other UAFG sources remain constant;
- An 8% deterioration rate is applied to the remaining cast iron and unprotected steel. This deterioration rate has been derived from leakage survey analysis on MP cast iron (refer to Appendix 6).
- Multinet's UAFG in 2016 is 6.01% - the same as in 2015

The model forecasts:

- The recommended class B benchmark for 2018-2022 period are as set out in Figure 5 below. These have been calculated based on a 2017 launch point, which is derived from a three year average of actual UAFG from 2014 to 2016 and adjusted for an 8% deterioration rate to LP mains and MP cast iron and unprotected steel mains.

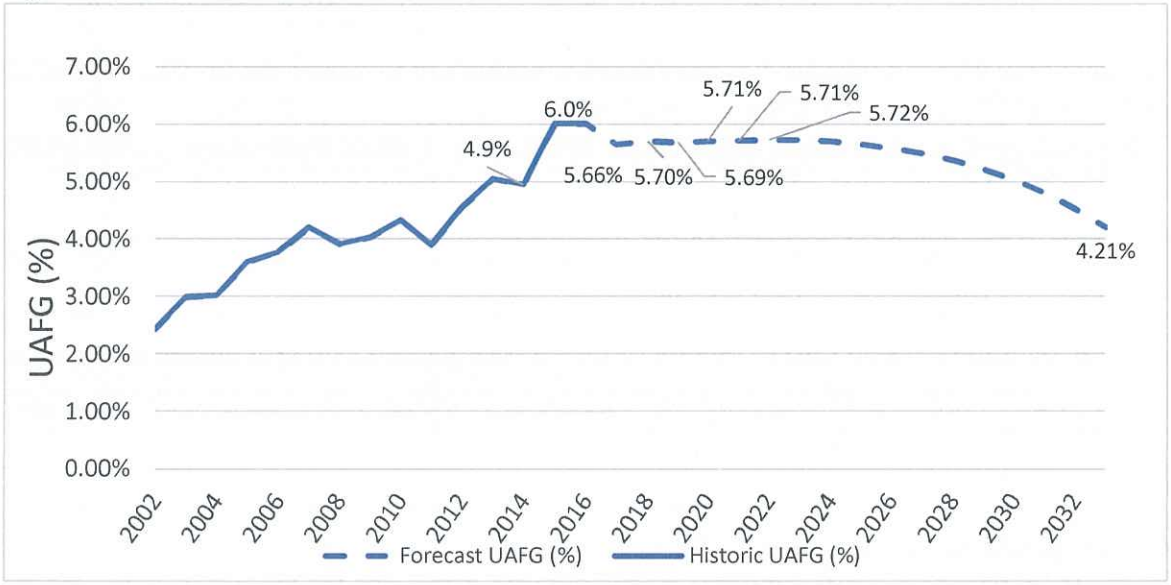
Table 4 Recommended annual class B UAFG benchmarks for 2018 to 2022

	2018	2019	2020	2021	2022
Per cent (%)	5.70	5.69	5.71	5.71	5.72

- A slight increase in Class B UAFG levels from 2017 until 2023 (5.72%) due to the deterioration rate of the remaining cast iron and unprotected steel being greater than the replacement rate, after which it decreases down to 4.21% by 2033 once Multinet has completed its mains replacement program.

  This is in line with actual UAFG for other Victorian gas distributors, who have a small population of cast iron and unprotected steel mains left in their network. The model therefore supports the finding that Multinet's longer length of cast iron and unprotected steel network and associated higher leakage rates provides a rational explanation for the divergence between its UAFG (from 2011) and the UAFG levels experienced by the other Victorian gas DB's that have similar assets and UAFG sources in all regards except for the length of LP and MP cast iron and unprotected steel mains.

Figure 5 – Mutlinet's forecast UAFG to 2033



AIA considers it timely to review on the classification of meters as Class A (assigned a 0.3% UAFG benchmark) or Class B (assigned a 4.1% UAFG benchmark). While this classification does not impact actual UAFG levels which are the primary focus of this report, it does impact the UAFG settlement. Annual reviews of Class A and Class B meters are required to ensure all customers with an annual demand in excess of 250,000 GJ are included in Class A. AIA confirms that Multinet undertakes annual reviews of the Class A customers and makes annual adjustments to the number of Class A customers in accordance with the market rules.

AIA notes that in relation to Multinet's Class A customers, around 50% are connected to the transmission network – in this case the 0.3% UAFG benchmark is appropriate, however 50% are connected to the distribution network – in this case AIA considers that the higher Class B benchmark is more appropriate.

To this end, AIA considers that it is timely for the Commission to undertake a review of the criteria for classifying Class A and Class B benchmarks.

7 CONCLUSION

AIA's assessment of the individual contributions of Multinet's 2015 UAFG of 3,392 TJ found that:

- 2,192 TJ are directly attributed to individual UAFG categories as defined by AIA. In particular:
  - 1,360 TJ are directly attributable to fugitive UAFG emissions; and
  - 832 TJ are directly attributable to measurement based UAFG.
- 1,201 TJ are "unknown" and have been distributed to individual categories in line with AIA's assessment of the uncertainty of each UAFG category as shown in Figure 4 above.

Figure 3 also shows AIA's assessment of UAFG levels in GJ for each UAFG component within key categories (fugitive, measurement and unknown). In particular, Figure 3 shows that:

- The largest contributor to Multinet's fugitive emissions continues to be leakage from the distribution network, especially the LP mains with its high population of the older cast iron and unprotected steel pipes that have high leakage rates; and
- The key component of Multinet's measurement based UAFG to be temperature compensation which involves gas being delivered to Tariff V customers on the network at a lower temperature than assumed in the gas bill. CTM measurement and meter accuracy are also key contributors to Multinet's UAFG.

AIA's assessment of Multinet's 2015 UAFG found that:

- Multinet's UAFG management practices and policies are in line with industry best practice. AIA considers that Multinet has maintained its UAFG at efficient and economically prudent levels over the 2013 to 2017 period given the nature of its network;
- Multinet has addressed all of the recommendations set out in AIA's 2013 report;
- There are no additional cost effective actions available to Multinet that would have effectively reduced the current effective Class B UAFG level below 6.0%;
- It is timely for the Commission to undertake a review of the criteria for classifying Class A and Class B benchmarks because 50% of Class A customers are connected to the distribution network and therefore AIA considers that these customers should be subject to the higher Class B benchmark;
- In view of the drivers of Multinet's UAFG, the key factor in reducing its UAFG requires the removal of its cast iron, PVC and unprotected steel pipes from its network;
- Modelling support AIA's view that Multinet's longer length of cast iron and unprotected steel network and associated higher leakage rates provides a rational explanation for the divergence between Multinet's UAFG (from 2011) and the UAFG levels experienced by the other Victorian gas DB's that have similar assets and UAFG sources in all regards except for the length of LP and MP cast iron and unprotected steel;

- When Multinet's replacement program achieves a similar low level of cast iron assets and unprotected steel assets, then it expects Multinet's, its UAFG will be in line with the levels experienced by AusNet and AGN;
- Forecasting UAFG levels over the period 2017 to 2033 shows that net leakage from Multinet's distribution network will not decrease in direct proportion to the length of cast-iron pipes that are replaced. This is because there is increased leakage from the remaining cast iron pipes (due to continuous deterioration) which offsets the leakage benefits until the "turning-point" has been reached. This means that there is a slight increase in Class B UAFG levels from 2017 until 2023 (5.72%) after which time it decreases to 4.21% by 2033 once Multinet has completed its mains replacement program. This is in line with actual UAFG for other Victorian gas distributors, who have a small amount of cast iron mains left in their network;
- It is critical that the methodology adopted by the Commission to set the 2018 to 2022 benchmarks recognise the significantly higher proportion of cast iron and unprotected steel in Multinet's network compared to AusNet and AGN who have nearly replaced all of these assets. This is because these material have highest leakage rates and AIA consider that coupled with an ongoing deterioration of these assets are driving Multinet's increasing UAFG;
- The recommended class B benchmark for 2018-2022 period are as set out in Figure 5 below. These have been calculated based on a 2017 launch point, which is derived from a three year average of actual UAFG from 2014 to 2016 and adjusted for an 8% deterioration rate to LP mains and MP cast iron and unprotected steel mains.

Table 5 Recommended annual class B UAFG benchmarks for 2018 to 2022

	2018	2019	2020	2021	2022
Per cent (%)	5.70	5.69	5.71	5.71	5.72

8 2018-2022 RECOMMENDATIONS

AIA's makes seven key recommendations that consider Multinet should undertake in the forthcoming 2018 to 2022 access arrangement period to ensure that it continues to prudently and efficiently manage UAFG.

1. **Mains Replacement** - The continuation of the planned mains replacement of the LP and MP network focused on the cast iron, unprotected steel and PVC parts of the network. AIA consider that this is critical long term capital investment to reduce UAFG and bring Multinet's UAFG level in line with the other Victorian gas DB's.
2. **UAFG Benchmarks** – AIA recommends that Multinet argue for the Commission to adopt a methodology to set the 2018 to 2022 UAFG benchmarks that recognise the significantly higher proportion of cast iron and unprotected steel in Multinet's network compared to AusNet and AGN who have nearly replaced all of these assets. This is because these material have highest leakage rates and AIA consider that coupled with an ongoing deterioration of these assets are driving Multinet's increasing UAFG.
3. **CTM Meters** - APA Gasnet have recommended a program to upgrade and / or replace 11 CTM sites. AIA support this program because replacing CTM's over 20 years old and ensuring all CTM sites are operating within their design capacity should reduce the measurement uncertainty associated with the CTM population.
4. **Large Tariff D meters** - AIA recommends that Multinet undertake a review of Large Tariff D meters to ensure all aspects of their metering design, operation and maintenance are in order. AIA considers that priority should be given to the largest Tariff D meters.
5. **Temperature** - The measurement of gas temperatures at I&C sites throughout Multinet indicated a flow weighted average temperature of 13C – 2C less than that assumed at billing. In addition the growth of customers connected to the HP network with pressure reduction immediately before the meter is further exacerbating this problem. This temperature effect is increasing year on year, especially during winter months where at peak demand customers can be receiving gas at up to 10C less than that assumed in billing. AIA recommends that the Victorian gas DB's undertake a review of the method and ability to change fixed correction factors for Basic Meters to reflect the actual or weighted average temperature of gas. Consideration needs to include the regulatory position and ability to change. This is likely to include a fuller assessment of temperature data over network, which can be captured by installing a number of electronic meters or temperature probes at residential tariff V customer properties to establish a more accurate tariff V annual temperature profile. Alternatives could also consider the use of meter correction in certain locations that are known to have colder gas.
6. **HHV** - The differential in HHV between Multinet and State-wide appears to be stable over the last few years with the predominant supply of higher HHV gas into Mutinet's networks compared to the State average. The generation of data on HHV values in

Multinet over the coming years should feed into the AEMO Industry Reference Group to review the current methodology prior to future GAAR reviews.

7. **Class A classification** - Multinet should continue to undertake annual reviews of the Class A customers. This is because the classification of a customer as Class A or Class B affects the average network benchmark and therefore has a financial effect on the UAFG settlement. The effect is to distort the benchmark on an annual basis depending on how many customers are incorrectly classified in one year.
   AIA also recommend that Multinet seeks a regulatory review of the appropriateness of the current Class A benchmark. This is because most Class A customers are connected to the distribution network not the transmission network, which means that around half of Class A customers are subject to many of the contributory UAFG categories included in the Class B benchmark.

APPENDIX 1 - REVIEW OF MULTINET'S UAFG STRATEGY AND POLICIES

AIA have reviewed the current Multinet UAFG management policies, the details of the subject are covered in several documents as provided by Multinet including:-

- Document No: MG-SP-0012 Large Diameter Cast Iron Mains Replacement Strategy July 2014 – June 2019
- Document No: MG-SP-0016 Pipework's Capacity and Replacement Strategy 2013/14 to 2017/18
- Document No. SP-MG-0003 Supply Regulator Strategy 2015-2020
- Multinet 2016 Regulator Schedule (Set Points)
- Document No. ES-GM-4305 Low and High Pressure Domestic Regulators
- Document No. EC-LS-5201 Leakage Survey - Gas Distribution and Transmission Pipelines
- Document No. MG-SP-0005 Large Consumer Regulators – Strategy July 2014 to 2019
- Document No. MG-SP-0006 Small Consumer Regulators – Strategy July 2014 to 2019
- Document No. EC-GM-4347 Field Life Extension of Domestic Meters
- APA Document – Multinet Meter Strategy Plan 2015 Rev C
- AEMO Document - Wholesale Market Distribution UAFG Procedures (Victoria) Version 3.0
- AEMO Document – Wholesale Market Metering Uncertainty Limits and Calibration Requirements Procedures (Victoria

Listed below is a summary the activities Multinet carry out based on the above policies and procedures which impact UAFG:

1. Large diameter mains replacement driven by pipe condition assessment and the risk of a gas escape causing injury to people and damage to property
2. Small diameter mains replacement driven by the optimization of replacing assets with high rates of leakage /risk of fracture with the economic efficiency of block renewals, hence reducing UAFG, leaks and fractures.
3. Smart regulator control stations to minimize leakage from the distribution assets in all weather conditions using SCADA and fringe point control
4. Minimize leakage on smaller supply regulators by minimizing summer and winter pressure set points based on local network requirements which are reviewed annually for each supply regulator
5. Regular maintenance and calibration of sites with temperature and pressure transducers
6. Ensuring consistency in the pressure set points and operational performance of low and high pressure domestic supply regulators
7. Monitoring of the distribution pipelines by leakage survey focused on assets in high population density, of a high risk of failure and during weather conditions that are likely to cause leakage from the network.
8. Respond to all public reported gas escapes and repair where gas leaks found
9. Meter replacement in accordance with Australian Standards to reduce metering error

10. Larger I & C meters on a reduced replacement schedule when compared to domestic meters
11. I&C customer meter/regulator sets on scheduled maintenance which includes set point schedules

12. Pressure and temperature correction on large consumers to minimize measurement error
13. Auditing of Contractors carrying out calibration and maintenance of Daily Metered sites
14. CTM calibration in accordance with AEMO market rules to minimize metering error (undertaken by APA Gasnet). APA Gasnet look to maintain uncertainty within +/- 1.0% and when uncertainty is found outside this range then remedial action is recommended to bring the uncertainty back to +/- 1.0%.
15. APA Gasnet undertaking ongoing reviews of Multinets CTM's and are currently recommending immediate or short term upgrade or replacement to 11 Multinet CTM sites. This is mainly due to lifecycle (20 years +) replacement or the CTM regularly operating around 120% capacity (7 CTM sites) with an unknown impact on measurement uncertainly.
16. Type testing and batch testing of Meter manufactures meter repair and accuracy testing compliance
17. Annual UAFG reconciliation process to identify errors, duplications of meter readings etc.
18. Metering of all system use gas such as water bath heaters
19. Monitoring of Daily Metered Customer data for breakdown or faulty equipment
20. Ongoing substitution of incorrect or missing data with estimated or recovered actual data.

APPENDIX 2 - INFORMATION PROVIDED

In order to undertake the assessment AIA requested and was provided extensive information on the networks included in the Victorian Access Arrangements, including:-

- The length and diameter of all pipelines and mains by pressure tier and material
- The UAFG level for 2013 to 2015
- The injections and withdrawals for 2015
- Tariff V and D withdrawals
- Class A and Class B withdrawals
- Customer numbers by tariff type
- Tariff D customer volumes with and without pressure and temperature correction
- Network Temperature data
- Network pressure set point data
- HHV profiles, actual and declared
- Number of services by material and pressure tier
- Levels of 3rd party damage for both mains and services
- Number of customers connected to each pressure tier
- Number of theft of gas detections
- Details on Own Use Gas
- Average Elevation and barometric pressure
- Previous UAFG and relevant reports
- Mains Replacement Program up to 2033

APPENDIX 3 - AUDIT OF COMPLIANCE WITH AEMO PROCEDURES FOR CALCULATING UAFG

In 2014, AIA undertook a detailed review of Multinets UAFG calculations to ensure compliance with AEMO procedures. The procedures and data used for the calculation of UAFG by Multinet was reviewed over a 2-week audit period. This was undertaken in conjunction with the Multinet personnel responsible for calculating UAFG and working through each element of the calculations included in the Multinet UAFG Spread sheet:-

Each element of the calculations were reviewed to understand the source of the data (either AEMO or Multinet)

- The calculations undertaken on injections and withdrawals within the spread sheet were reviewed to ensure compliance with the AEMO UAFG Reconciliation by Difference procedures and formula.
- Metering Data cut off dates were reviewed
- The manual checks on Class Z transactions (post cut-off date on previous year) were reviewed
- The manual checks on potential duplications of Tariff V customers (especially when transferring from Basic to Interval metering) were reviewed
- The manual checks on any duplicate transactions on Tariff D customers were reviewed (very infrequent occurrence)
- The NSL profiling of basic meters to calculate the consumption of each basic meter for the calendar year was reviewed.
- The UAFG calculations for each retailer were reviewed.

The review indicated that the Multinet calculation of UAFG was being undertaken in compliance with the AEMO procedures.

APPENDIX 4 - RECOMMENDATIONS FOLLOW UP

APPENDIX 4.1 KEY RECOMMENDATIONS

Ref No.	Category	AIA Recommendation	MG Response
1	CTM meters	Further investigate the largest meters to ensure they are set up correctly and calibrations are being correctly conducted by APA Group / AEMO. This requires analysis of the processes and rights used to calibrate and maintain CTM meters and may include specialist site analysis of the key CTM sites.	• Reviewed the metering Strategy Plan for all Turbine CTM's • Reviewed calibration certificates and yearly meter proving results for all CTM's • Attended meter proving and held several meetings with APA measurement department
2	Large Tariff D meters	Review these meters to ensure all aspects of metering design, operation and maintenance are correctly undertaken by Multinet. Priority should be given to the largest Tariff D meters	• Conduct regular reporting to identify all I&C sites with an incorrect correction factor and rectify accordingly. • Completed SAP system enhancement to link I&C maintenance data to billing data. • Developed program of works to retrospectively install temperature and pressure correction on large Tariff D sites where inaccuracy due to natural variation of temp and pressure is significant. Sites have been run through an EFT and found to be economically feasible.
3	Temperature correction for basic meters	Review of the method and ability to change fixed correction factors for Basic Meters to reflect the actual weighted average temperature of gas being measured. Consideration needs to include the regulatory position and ability to change. This is likely to include a fuller assessment of temperature data over network. Alternatives should also be determined for the use of meter correction in certain locations that are known to have colder gas.	Developed a program of works to retrospectively install temperature and pressure correction on sites where inaccuracy due to natural variation of temperature and pressure is significant.

Ref No.	Category	AIA Recommendation	MG Response
4	Class A classification	The classification of a customer as Class A or Class B does affect the benchmark and therefore has a financial effect on the UAFG settlement. The effect it to distort the benchmark on an annual basis depending on how many customers are incorrectly classified in one year. This has meant over the 2010 to 2011 period the benchmark has on balance been understated based on a strict annual definition of Class A customers being applied The allocation of Class A customers needs to be continually monitored and updated, potentially retrospectively	Class A and B customers are monitored yearly and are reclassified at the end of the year for the following year. Classification of class A cannot be retrospectively applied for the year as this is the process governed by AEMO.
5	UAFG Benchmarks	Set UAFG forward benchmarks taking consideration of the UAFG breakdown. The effect of any regulatory changes to Temperature correction, Class A classification and other UAFG breakdown identified in this report and impacted in the gas access arrangement review needs to be included in forward UAFG benchmarks	N/A
6	General	A general recommendation is to ensure that a broader understanding of UAFG, including the inherent uncertainty is gained within UAFG. This should include improving the quality of data available in all the UAFG categories and that the UAFG estimation can be improved over the next regulatory period.	• UAFG project group was commissioned in 2015 to focus on reducing UAFG levels • Discussions with APA/AGN on UAFG to share learnings • An audit was conducted by AIA as part of the 2014 audit of Multinet's UAFG calculation. This found full compliance with the AEMO procedures.

APPENDIX 4.2 MEASUREMENT BASED RECOMMENDATIONS

Ref. No.	AIA Recommendation	MG Response
3.1a	An indication of the number of estimated meter reads within Multinet's network area should be established. This would confirm that UAFG due to timing mismatch is at a negligible level and provides a benchmark for Multinet to compare periodically.	Difficult to get an indication on number of estimated reads which may affect UAFG as reads are revised frequently. Therefore, MG has looked into particular reasons why estimated reads may be occurring and conducted several investigations as a result. E.g. no access, faulty dials
3.1b	The process for estimating readings could be audited in detail to ensure that the estimation follows the process required by AEMO. Auditing may also determine a more accurate estimate of the associated errors.	Audit conducted by AIA as part of the 2014 audit of UAFG calculation. Audit found full compliance with the AEMO procedures.
3.1c	Large adjustments uncovered after UAFG reconciliation should be adjusted to the time period in which they occurred when analysing UAFG trends for regulatory or other purposes. Note that no post reconciliation adjustments were provided to AIA.	Large adjustments after UAFG reconciliation are monitored, however under the market rules any revised reads to the value of $250k or less outside the 6 months of market acceptance will not be considered for a UAFG special revision and hence not included in the calculation.
3.2a	The process and responsibility for classification of Class A customers be confirmed. This should include raised awareness of the importance of metering for Class A customers and consideration on the effects of forecasting UAFG forward into the next regulatory period.	Classification of customers as Class A or B are monitored yearly and are reclassified at the end of the year for the following year. Classification of class A cannot be retrospectively applied for the year as this is the process governed by AEMO.
3.2b	Periodic review of correction factors, to identify customers that are allocated an incorrect factor.	• Conduct 6 monthly report on PCF for I&C customers • Conduct site visits on targeted samples of domestic customers
3.2c	Detailed audit of systems associated with the Multinet Billing System and the Multinet SAP Database, particularly with regards to entry of new customer meters and transfers of data	• Conduct monthly reports that identify discrepancies with Billed consumption versus SAP consumption, BMP consumption Versus SAP consumption • Conduct regular audits on meter inventory control to ensure all meters in store are accounted for
3.2d	Identification of clear processes for UAFG calculation for both rolling UAFG and reconciled UAFG calculations. This should particularly include clear identifications of assumptions made and clear handling of Class A meter data	Audit conducted by AIA as part of the 2014 audit of UAFG calculation. Audit found full compliance with the AEMO procedures. Notwithstanding this, the processes and procedures have been revised to include clear assumptions

Ref. No.	AIA Recommendation	MG Response
3.3a	Given that UAFG is a direct measure of "Input – Output" and no allowance is made for CTM (Input) errors there is a strong incentive to undertake full independent meter audits at each of the CTM locations in order to establish realistic levels of measurement uncertainty and identify issues at each location that reduces measurement uncertainty to the absolute minimum. There is therefore the potential for measurement errors in a small number of the large CTM's to have a major impact on the level of UAFG	• Reviewed the metering Strategy Plan for all Turbine CTM's • Reviewed calibration certificates and yearly meter proving results for all CTM's • Attended meter proving and held several meetings with APA measurement department
3.3b	An audit of the largest CTM sites, should initially be undertaken in order to try and obtain the maximum gain with the minimum of effort	See response to 3.3a
3.3c	The relatively small number of Class A meters should be included in the initial audit of the network input/output measurements	Class A meters are accuracy tested each year in accordance with *AS4944 Gas Meters - in Service compliance testing*
3.3d	The above analysis has also indicated the possibility of measurement errors in the smaller CTM's, consequently audits of all installations should be planned over time following the initial audit of the larger installations.	See response to 3.3a
3.4a	A full review should be undertaken of corrections factors currently in use within the Multinet network. This should be conducted within the boundaries set within the Victoria Government Gazette S 60 dated 22nd June 1998	Reviewed correction factors across all meters in the network and any non-standard correction factors have been rectified. MG conducts a 6 monthly report to identify these.
3.4b	Following the completion of the correction factor review, comparisons can be made against calculated factors for both fixed and site specific applications and recommendations made to identify the most cost effective solutions for each pressure tier and class of meter	Developed program of works to retrospectively install temperature and pressure correction on sites where inaccuracy due to natural variation of temp and pressure is significant. Sites have been run through an EFT and found to be feasible.
3.4c	Gas temperature data should be collected over extended periods from different locations within the Multinet network. Until such time as accurate gas temperature data is available historical values can be used if such data is available	Gas temperature data has been collected from several large I&C sites with temperature monitoring from differing geographic locations across Melbourne.
3.4d	The use of zero correction factors to 193 I & C and 215 Basic meters should be rectified as soon as possible to ensure correct billing and remove the uncertainty of these errors from the UAFG calculations	These have been rectified

Ref. No.	AIA Recommendation	MG Response
3.4e	An investigation should be carried out to ascertain the reason for the small deviations from the published AEMO figures for 15 I & C and 71 basic meters identified in Tables 11a & 11b, excluding those with zero pressure correction factors.	These were identified as been manual input errors and have since been rectified
3.5a	A review of the application of HHV values in the calculation of metered energy values at CTM's fitted with Coriolis meters should be undertaken or included with the proposed audits of these sites.	Uncertainty on gas composition is included in the in situ meter testing results conducted by APA.
3.5b	AIA recommends that the Multinet / State HHV differential is continuously monitored to identify any trends that would support a change in the UAFG benchmark in the future, especially as the lower HHV Bas Gas is now fully operational. This change in Bass Gas supply coincides with the increase in the Multinet UAFG levels since the Commission's HHV report in October 2010.	HHV has been continuously monitored and no significant trends have been identified
3.6a	The performance of all CTM and Class A meters should be included in the proposed meter audit (recommendation 3.3) to assess their current performance against initial design standards to ensure that there has been no change in performance over time.	See response to 3.3a
3.6b	A review of the procedures and techniques used by Multinet to identify faulty or problematic batches of Class B meters should be undertaken to ensure they meet current operation needs.	• All class B meters are accuracy tested in accordance with *AS 4944 Gas Meters - in Service compliance testing* and replaced accordingly through the Time Expired Meter Program. • Meters with potentially faulty dials are identified and rectified accordingly through regular reporting
3.7	AIA recommend that Multinet calculate the changes in Linepack between the start and end of the UAFG to monitor the materiality of any Linepack changes on the calculated annual UAFG levels.	Changes in Linepack were found to be minimal
3.8	AIA recommends that all water bath heaters, and any other sources of own use gas, should be separately metered, and hence remove this element from UAFG.	All Multinet Gas sources of own use are metered
3.9	Initiatives are developed with the meter readers to further help identify occurrences of meter by-pass tampering and theft.	• Have introduced meter reader incentives to identify meters that are not registered in the system • Have run workshops with meter readers for identifying theft and meter by-pass tampering

APPENDIX 4.3 FUGITIVE BASED RECOMMENDATIONS

Ref. No.	AIA Recommendation	MG Response
4.2	The Multinet replacement program should prioritise replacement based on the following factors: • Focus on the cast iron and the non-protected steel networks • Prioritise the above where economic in the MP network which has the greatest leakage rates • Prioritise the above on high risk mains which are of greatest risk of failure, and at locations that are of greatest risk to the public and property.	• Replacement program has a strong focus on cast iron and non-protected steel. • Replacement program for LP- HP has been prioritised based on fracture rates. • All MP cast iron will be decommissioned within next 5 years once the LP systems been supplied by the MP has been upgraded to HP
4.3	Multinet should (continue to) include the replacement of unprotected steel services where they are connected to a main that is being replaced. Additionally, Multinet should monitor service leakage and if any zonal hot spots develop, then consideration should be given to replacing all older unprotected steel services in that zone.	Multinet continues to replace unprotected steel services with High Pressure standard poly services during upgrade works. Leakage on unprotected steel services is monitored and any problem areas are rectified accordingly.
4.4	AIA recommends that leakage from meters be monitored to identify any trends in geographic zone, type or age. This would form the basis of remedial maintenance or replacement programs	Has been monitored and no trends have been identified
4.5a	AIA recommends that valve leakage be monitored to identify any trends for inclusion in a remedial maintenance program.	Has been monitored and no trends have been identified
4.5b	AIA recommends that a survey is undertaken of all regulators that bleed to atmosphere to establish the materiality on UAFG. The survey should also include the potential for remedial actions, e.g. bleed into downstream network instead of to atmosphere.	Initial surveys indicated minor impact to UAFG levels
4.6	AIA recommends that Multinet ensures it has robust procedures to manage any third party damage to ensure other utilities are very aware that any damage to Multinet assets will result in charges for the repairs including the cost of lost gas.	Initiative has been developed to charge third parties for lost gas. Other preventative measures are DBYD, TP markers, high pressure markers, TP awareness program
4.7a	AIA recommends that LP networks are identified that would benefit from the application of Profile Controllers, especially networks that are not prioritised for replacement and have large pressure differentials at times of peak demand.	The application of Profile Controllers was investigated and found to be infeasible due to the integrated nature of the LP network. We are currently investigating other avenues to better manage network pressure in the LP network.

Ref. No.	AIA Recommendation	MG Response
4.7b	A cost benefit exercise on each candidate network should then be undertaken for the installation of Profile Controllers, with the benefits including • the reduction in UAFG in line with the reduction in average network pressure • the reduction in call outs to PRE's in line with average network pressure • the reduction in repair costs to leaks in line with average network pressure	See response to 4.7a

APPENDIX 5 - MULTINET REPLACEMENT PROGRAM 2016 TO 2033

		Submitted to the AER															
Year	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Low Pressure	128	126	128	128	135	107	126	126	126	126	126	126	126	126	126	126	126
Medium Pressure - CI / UPS	4.8	10.2	5.5	8.1	3.0	5.4	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Total	133	137	133	136	138	113	133	133	133	133	133	133	133	133	133	133	133

Assumptions/comments

- Lengths are in km;
- Works are planned until 2022. The remaining network length of LP is divided evenly over the remaining years to get a constant replacement rate of 126 km/yr;
- All MP cast iron is to be replaced by the end of 2022;
- MP steel (unprotected) is to be replaced at a rate of 6.6 km/yr from 2023 onwards.

APPENDIX 6 - DETERIORATION RATE OF THE CAST IRON NETWORK

MP leaks on Cast Iron		
Year of Survey	2011	2015
Period from previous survey (years)	1	4
Leak indications	-	117
Conversion of leak indications to actual leaks	-	63%
new leaks formed	30	73
Length of main surveyed (km)	29	12.68
new leaks/yr/km	1.03	1.44
Deterioration rate	8.70%	

Assumptions/comments

- Survey done in 2010 found 100 leaks across 29km, all of which were repaired
- Deterioration rate is compounded across the period (4 years);
- Surveys done on medium pressure cast iron;
- Surveys done on LP were not chosen for this analysis due to large variations in mains surveyed and length of mains as a result of pipework's;
- Leak indications found in 2015 were not pinpointed, as a result a conversion to actual leaks was required;
- Assume 63% of leak indications correspond to actual leaks on MP CI due to LP mains on the same side of the road as MP and the one leak registering as two leak indications on the leak indication survey;
- A deterioration rate of 8% was chosen as a conservative measure.