Final Plan Attachment 8.3

Meter Replacement Plan

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Contents

1. Introduction

1.1. Purpose

Australian Gas Networks Limited (AGN) reticulates gas to approximately 650,000 customers in the Victorian and Albury natural gas distribution networks (the networks). The volume of gas delivered to a customer is measured through a meter, with meter measurements being a key input into customer bills.

Under the *National Measurement Act 1960* (Commonwealth) (National Measurement Act), the Victorian Gas Distribution System Code (Victorian Code)[1] and the New South Wales *Gas Supply (Safety and Network Management) Regulation 2013* (NSW Regulation) we have a regulatory obligation to manage the integrity of these meters and ensure they operate within a prescribed tolerance band for metering accuracy (i.e. +2% to -3% of the volume of gas delivered at the site). Periodic Meter Changes (PMCs) must therefore be carried out to:

- test the accuracy of meters; and
- replace meters when the accuracy of their measurements falls outside the prescribed band.

Failure to maintain the accuracy of meters to the required standards increases the likelihood of customers being charged the incorrect amount for gas usage, and for meters servicing larger customers, inaccuracy can have a significant effect on the level of unaccounted for gas. It can also result in a breach of our licence obligations, penalties and other compliance actions.

This Meter Replacement Plan (the Plan) provides an overview of the current stock of domestic and commercial meters in our networks, the standards for metering installations and the obligations we have to test and replace these meters. The Plan also outlines the process that we will follow in the next (2018 to 2022) Access Arrangement (AA) period to ensure that we comply with our regulatory obligations in relation to these meters and sets out our forecast capital expenditure (capex) on PMCs for domestic and commercial meters over this period.[2]

In developing this Plan, we have had regard to:

- the metering standards and other regulatory obligations set out in the National Measurement Act, the Victorian Code, the NSW Regulation and Australian Standard (AS) 4944 (Gas meters – In-Service Compliance Testing); and
- rule 79 of the National Gas Rules (NGR), which requires capex to be:
  - such as would be incurred by a prudent service provider, acting efficiently, in accordance with accepted good industry practice to achieve the lowest sustainable cost of providing this service; and
  - justifiable on one of the grounds set out in rule 79(2), which includes being necessary to maintain the integrity of services and to comply with a regulatory obligation or requirement.

[1] While the Albury Network is located in New South Wales, it is subject to the metering provisions in the Victorian Code. See Section 2.2 for more detail.

[2] Note that this Plan does not include Tariff D interval meters because the cost of these meters is recovered directly from the Tariff D customers.

This Plan has been developed and reviewed as part of our asset management planning processes and is an input into the Asset Management Plan (AMP), which is provided as Attachment 8.1 to our Final Plan.

1.2. Stakeholder Engagement

We are committed to operating our networks in a manner that is consistent with the long-term interests of our customers. To facilitate this, we have implemented a stakeholder engagement program to understand and respond to the priorities of our customers and stakeholders. This Plan, and the proposed meter testing and replacement, are consistent with stakeholder feedback that maintenance and improvement of network safety is of highest importance and that customers are concerned with recent price increases.

Further information on our stakeholder engagement program is available in Chapter 5 of our Final Plan.

1.3. Document Structure

This document is structured as follows:

- *Metering Related Regulatory Obligations* – outlines AGN's metering related obligations under the National Measurement Act, the Victorian Code, the NSW Regulation and Australian Standard AS 4944;
- *Meters in the Victorian and Albury Networks* – sets out the types of meters currently in operation in our networks;
- *Meter Replacement Policy*– outlines the meter replacement policy for the next AA period; and
- *Forecast Meter Replacement Program* – describes the forecasting methodology that we have used to determine the amount that is expected to be spent on PMCs in the next AA period to comply with our regulatory obligations and sets out the results of the application of this methodology.

2. Metering Related Regulatory Obligations

This chapter outlines AGN's role in customer metering, some basic metering concepts and the obligations we have to test and replace meters. For more information relating to other metering obligations, please refer to our AMP provided as Attachment 8.1 to our Final Plan.

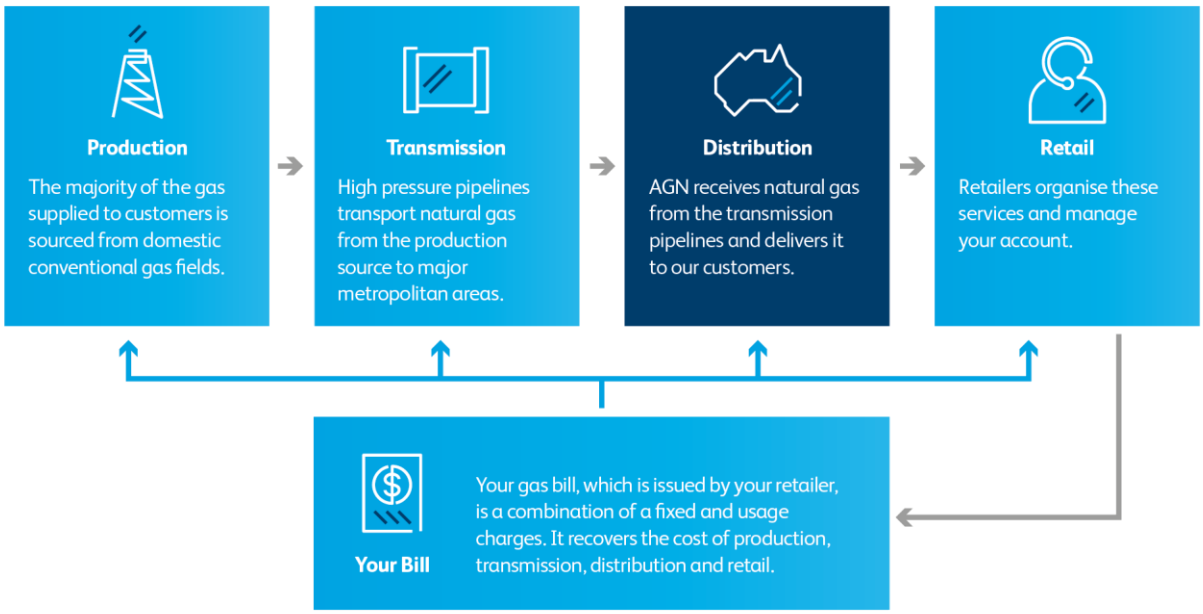
2.1. Role of AGN in Customer Metering

Our role in supplying natural gas to customers is illustrated in Figure 2.1. As this figure highlights, we own the distribution networks that transport gas directly to the customer and also own, maintain and read the meters at each customer site.

The majority[3] of customers connected to our distribution networks have their gas transported to them by retailers, who are responsible for purchasing natural gas from producers, transporting the gas through the transmission and distribution networks and billing customers for all of the services required to supply natural gas to their site, including the use of the distribution network. The metering information we collect is a key input into a retailer's billing Process.

The costs of using the distribution network are recovered from customers through a fixed supply charge and a volumetric (consumption) charge, with the volumetric charge directly related to the amount of gas supplied to each customer site. Meters are used to measure the volume of gas delivered to each customer site.

Figure 2.1: AGN's Role in the Gas Supply Chain



[3] While there are a small number of large industrial customers that enter into their own gas supply and transportation arrangements, the majority of customers rely on a retailer for that service.

Our asset management service provider, APA Asset Management (APA),[4] is responsible for installing meters in our networks.[5] It is also responsible for carrying out the PMCs that are required to:

- test the accuracy of the meters; and
- replace meters when their accuracy falls outside the prescribed tolerance band.

The testing of meters is currently carried out by a National Association of Testing Authorities (NATA) accredited facility, while the meter replacement activities are carried out by a combination of APA staff and contractors.

2.2. Meter Concepts

There are three main types of meter design used in the Victorian and Albury networks: diaphragm meters, rotary meters, and turbine meters. These meters are typically grouped according to their service category, with the groupings including:

- *domestic meters* – which are typically diaphragm meters with a capacity up to 25m^3 per hour that are used to supply both residential and small commercial and industrial customers;
- *non-domestic meters* – which may be either diaphragm or rotary meters with a capacity greater than 25m^3 per hour that are used to supply medium to large scale commercial facilities; and
- *industrial meters* – which are usually turbine meters with a capacity greater than 25m^3 per hour that are used to supply large industrial customers.

The latter group of these meters are used at Tariff D customer sites (i.e. customers consuming more than 10 TJ per annum). The cost of replacing these meters is recovered directly from these customers, so they are not discussed any further in this Plan. Implicit in this, any reference to meters of size >25m^3 per hour is referring to non-domestic meters as defined above.

Meters are also usually grouped into families, with the term "*family*" being used to refer to "*a quantity of meters that is considered uniform*". Consistent with AS 4944 and with the National Measurement Institute's document NITP 14, a meter family (also known as meter population) has the following details in common:

- manufacturer;
- country of manufacture;
- type or model of the meter;
- year of manufacture (within the same 12 month period);
- year of initial verification in the country of manufacture (within the same 12 month period);
- accuracy class; and
- certificate of approval.

For example, the Email 602 meter type, which was manufactured in each year between 1987 and 1994, consists of eight meter families (populations).

[4] As outlined in Chapter 2 of AGN's Final Plan, APA manage and operate AGN's natural gas distribution networks.

[5] APA is required to install the meters in a position that allows unimpeded access to any person that is required to test, adjust, maintain, repair or replace the metering installation or collect metering data. Once the meters are installed, customers are responsible for ensuring their meter remains accessible to meter retailers.

2.3. Meter Testing and Replacement Obligations

As outlined in Chapter 1, this Plan relates to meters installed in our Victorian and Albury networks, which are subject to the following regulatory obligations:

- *National Measurement Act 1960 (Commonwealth)* – Gas measurement laws are governed through the National Measurement Institute by the Chief Metrologist, who is empowered to oversee and administer the National Measurement Act. This Act sets out the requirements that apply to utility meters used for trade, their verification and the penalties for failure to comply with certain provisions in the Act.[6]
- *Victorian Network* – As a condition of our Victorian Gas Distribution Licence, we are required to comply with the metering related provisions set out in the Victorian Code. Amongst other things, the Victorian Code:[7]
  - requires us to provide metering installations and sets out our obligations in relation to the standard of those installations, meter testing and replacements, and the collection and provision of metering data to retailers;[8] and
  - requires us to comply with AS 4944 when determining the initial and ongoing life of a meter family defined in this standard and when testing these meters.[9]
- *Albury Network* – As a condition of our New South Wales Gas Reticular Authorisation, we are required to comply with the *NSW Gas Supply (Safety and Network Management) Regulation 2013* (NSW Regulation), which amongst other things states that when operating our network we must take into account any standards, including AS 4944 (Clause 6).[10] As a 'declared distribution system' under the National Gas Law (NGL) and NGR[11] the Albury Network is also required by the NGR[12] and the Victorian Retail Market Procedures[13] to comply with the metering provisions in the Victorian Code.

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6 Under this Act, a person may be required to pay a penalty if they supply a utility meter for trade that gives an inaccurate measurement. The maximum penalty for such an offence is 200 penalty units, with each penalty unit worth $180. The maximum penalty that could be payable if a single meter was found to give an inaccurate measurement (i.e. running fast) is therefore $36,000.

7 The Victorian Code can be accessed online here: http://www.esc.vic.gov.au/document/energy/26123-gas-distribution-system-code-2/. This Code has been developed by the Victorian Essential Services Commission (ESC) and applies to all distributors that hold a distribution licence. The Code sets out the minimum standards for the operation and use of the distribution system, which include, amongst other things, minimum standards for connections, augmentations and metering installations. As stated in the notes to section 3 of the Code, clause 4 of AGN's Gas Distribution Licence requires compliance with this Code.

8 These provisions can be found in sections 5-8 of the Victorian Code.

9 These provisions can be found in section 7 of the Victorian Code.

10 The Regulation can be accessed online here: http://www.legislation.nsw.gov.au/regulations/2013-478.pdf. Under this Regulation, a corporation can be subject to a maximum penalty of 100 penalty units if they fail to comply with the requirement to take into account any standards (including codes, Australian Standards, guidelines or other requirements) when designing, constructing, operating or extending a gas network or any part of a gas network. A penalty unit in NSW is currently worth $110. The maximum penalty that could be payable under this regulation for a breach of AS 4944 is therefore $110,000.

11 The Albury network was defined by the Victorian Government as a 'declared distribution system' through a Ministerial Order made under section 39 of the *National Gas (Victoria) Act 2008*. See Victorian Government Gazette, No. S 222, 30 June 2009.

12 See for example, rules 298 and 304 of the NGR. Rule 298 requires metering installations at a distribution delivery point to satisfy the uncertainty limits set out in a 'declared metering requirement', while rule 304 requires the responsible person to ensure that metering data can be transmitted or otherwise collected and delivered to the metering database from its metering installations within the applicable accuracy parameters set out in the 'declared metering requirement'. For the purposes the NGR, the Victorian Code has been deemed to be the 'declared metering requirement'. See Victorian Government Gazette, No. S 222, 30 June 2009.

13 The Victorian Retail Market Procedures, which the Albury Network is subject to, also require compliance with the Victorian Code. A copy of the Retail Market Procedures can be accessed online here: https://www.aemo.com.au/Gas/Retail-markets-and-metering/Market-procedures/Victoria.

It is worth noting in this context that AS 4944 (Gas meters – In-Service Compliance Testing) only applies to meter families with a capacity of 25 m^3 per hour or less.[14] A distinction can therefore be drawn between meter families with a capacity:

- *up to 25m^3 per hour* (i.e. domestic meters), which are subject to AS 4944, the Victorian Code and the National Measurement Act; and
- *greater than 25m^3 per hour* (i.e. commercial meters), which are subject to the Victorian Code and the National Measurement Act.

Our meter testing and replacement obligations under AS 4944 and the Victorian Code are outlined in Sections 2.3.1 and 2.3.2 respectively.

Before moving on, it is worth noting that failure to maintain the accuracy of meters to the required standards increases the likelihood of customers being charged the incorrect amount for gas usage and, on larger meters, can have a significant effect on the level of unaccounted for gas. Failure to comply with the obligations outlined above can also result in:

- a breach of our licence conditions and authorisation in Victoria and New South Wales;
- a range of enforcement actions by the Essential Services Commission (ESC) as outlined in its *Compliance Policy Statement for Victorian Energy Businesses*.;[15] and
- penalties being applied under the National Measurement Act and/or the NSW Regulation.

2.3.1. Meter Testing

2.3.1.1. Domestic Meters

AGN is required by the Victorian Code to carry out, or cause to be carried out the following tests on meters up to 25m^3 per hour:

- acceptance tests before a new meter is placed into service, before a meter that has been removed from service is placed back into service and after any repairs, maintenance or recalibration is performed on a meter;[16]
- Initial In-Service Compliance testing, which must be carried out in accordance with the requirements set out in AS 4944;[17] and
- Field Life Extension (FLE) testing (also referred to as Ongoing In-Service Compliance testing), which must be carried out in accordance with the requirements set out in AS 4944. [18]

AGN is also required to carry out testing if a customer requests such a test.[19]

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[14] AS 4944:2006 section 1 Scope and section 4.1.2 Maximum flow rate.

[15] The Compliance Policy Statement can be accessed online here: http://www.esc.vic.gov.au/document/energy/26270-compliance-policy-statement-for-victorian-energy-businesses/. The range of compliance actions that the ESC can take include:

- Serving an enforcement order on the business, which requires compliance or rectification within a defined period of time;
- Penalties for non-compliance with an enforcement order, with the maximum penalty being 5,000 penalty units (which may be increased by 500 penalty units for each day after the service of the order that contravention continues);
- Varying a licence if the business fails to comply with the enforcement order; and
- Revoking a licence, if the business does not comply with an enforcement order.

[16] Victorian Code, section 7.2.1.

[17] Victorian Code, section 7.2.3(a).

[18] Victorian Code, section 7.2.3(a)(v).

[19] Victorian Code, section 7.2.2. This section of the Code requires AGN to:

The pass/fail criteria for these tests are set out in Schedule 1 Part B of the Victorian Code and summarised below:

> *"…the maximum allowable variance (error Units) in quantity from the agreed true quantity for gas meters shall be:*
>
> *a) Not more that* (sic) *2 percent in favour of the Distributor;*
>
> *b) Not more that* (sic) *3 percent in favour of the Customer."*
>
> *The maximum allowable error limit range for correctors shall be ±1 % in addition to the error limits outlined in (a) and (b) above.*
>
> *Except where provided for in a sampling plan approved by the Commission, the error limit range of meters and correctors shall be established under standard conditions at (1) 20% and (2) 100% of the badge capacity of the meter, by a testing agency approved by the Commission.*
>
> *The testing procedures for gas meters and correctors shall have an uncertainty limit of no more than 1%."*

Our meter testing program is therefore carried out to ensure:

- the net volume of gas delivered to each delivery point falls within the prescribed tolerance band of metering accuracy;
- metering installations do not show any systematic bias within the allowable margin of accuracy and meters are not tampered with, or calibrated with the intent of causing bias in the meter; and
- the tolerances of the individual components (meters, correcting instruments, pressure and temperature transmitters) used to measure gas supplied to a customer are such that the gas measured is within a margin of accuracy of ±1% of the net volume of gas supplied for new meters leaving the manufacturer.

The remainder of this section provides further detail on the Acceptance testing, Initial In-Service Compliance testing and FLE testing requirements.

Acceptance Testing

As outlined above, AGN is required to carry out, or cause to be carried out, acceptance tests on new and refurbished meters and meters to be placed back into service. The term "*acceptance testing*" is defined in the Victorian Code as the "*testing and setting conducted by a manufacturer or installer on a meter, corrector or metering installation to establish the initial calibration of the meter, corrector or metering installation.*"

To comply with this requirement of the Victorian Code, AGN requires domestic meters to be tested prior to delivery by the manufacturer or refurbisher in accordance with AS 4647-2005 to an accuracy of at least ±1%.[20]

Meters received from manufacturers with accredited testing facilities are sealed prior to delivery and accepted without further testing. These meters are inspected on delivery to ensure the seals

- give the customer at least five business days' notice (or agree such other mutually convenient time) of when the requested test is proposed to be performed; and
- test a metering installation within 15 business days of a request from an affected party to ascertain whether or not the installation is defective.

This section also allows AGN to seek payment from the affected party of the costs of testing the metering installation and associated costs if the installation is not defective and meets the accuracy standards set out in the Code.

[20] Manufacturers are required to supply on this basis under the terms of their contracts with APA.

are intact and no damage has occurred during transit. If the inspection is satisfactory, these meters are accepted without further testing, prior to installation. If the inspection is not satisfactory, then the meters will be subject to further testing.

Initial In-Service Compliance Testing

Once a meter family is placed into the field then it may, depending on when it was installed, be subject to an Initial In-Service Compliance test to determine the initial meter life. This is referred to in AS 4944 as the compliance period, which is the interval before FLE testing is required to demonstrate that the meter family is maintaining its accuracy within an acceptable range.

In keeping with AS 4944, meter families installed:

- *up to and including 2005* are deemed to have an initial field life of 15 years, from the date of their original installation.[21] In mid-2016 there were approximately 259,318 of these meters installed in the Victoria and Albury natural gas distribution networks (the networks); and
- *from 2006 onwards* are required to undergo an Initial In-Service Compliance test after a period of three to five years of field service to determine the initial meter life.[22] In mid-2016 there were approximately 370,987 of these meters installed in the networks.

For those meters installed from 2006 onwards, the Initial In-Service Compliance testing is usually carried out in the fifth year of service and, in keeping with AS 4944 is conducted by:

- removing a random sample of meters from the meter family (population) from the field that is sufficiently large to enable the testing to meet the sample requirements set out in Table 1 of AS 4944;[23] and
- testing whether the accuracy of this sample of meters falls within a ±1.5% band, a ±2% band, a ±2.5% band or a ±3% band, which is then used to determine the initial meter life (compliance period) as set out in Table 2.1.[24]

Table 2.1: Meters In-Service Compliance Period as Derived from Initial Service Test

	Accuracy From Initial Service Test			
	Within ±1.5%	**Within ±2.0%**	**Within ±2.5%**	**Within ±3.0%**
Compliance Period	18 years	15 years	10 years	5 years

Source: AS 4944, Table 4.

Field Life Extension (Ongoing In-Service Compliance) Testing

Under AS 4944, meter families with a capacity of up to 25m^3 per hour must be tested to determine whether or not a meter family's field life can be extended beyond its designated initial meter life. This is referred to as FLE testing, or Ongoing In-Service Compliance testing.

[21] AS 4944, clause 6.2.1.

[22] AS 4944, clause 6.2.2.

[23] Given the potential for meters to be damaged when they are removed or transported to the testing site, or for other factors to prevent testing, AGN will usually take an additional 15% of meters from the field to ensure that the sample size that is tested meets the requirements in Table 1 of AS 4944.

[24] Note that there is some flexibility that meter populations can be grouped according to year of installation rather than manufacturer.

FLE testing generally occurs in the final year of a meter family's approved initial meter life (for example, a meter family with a 15 year initial life will be tested in year 14)[25] and, in keeping with AS 4944 is conducted by:

- removing a random sample of meters from the relevant meter family (population) from the field, with the size of the sample based on the requirements set out in Table 1 of AS 4944; and
- testing whether the accuracy of this sample of meters:
  - falls within a ±2% band, a ±2.5% band or a ±3% band, in which case the field life can be extended in the manner set out in Table 2.2; or
  - falls outside the +2%/-3% band, in which case the meter family will be failed and replaced.

Table 2.2: Accuracy Criteria for FLE Testing

	Accuracy From FLE Testing		
	Within ±2.0%	**Within ±2.5%**	**Within ±3.0%**
Field life extension	5 years	3 years	1 year

Source: AS 4944, Table 5.

2.3.1.2. Commercial Meters

Commercial meters (i.e. meter families with a capacity greater than 25m^3 per hour) are not, as noted previously, covered by AS 4944. The testing requirements for these types of meters are instead set out in the Victorian Code.

In a similar manner to domestic meters, the metering provisions in the Victorian Code require AGN to carry out, or cause to be carried out:

- acceptance tests before a new meter is placed into service, before a meter that has been removed from service is placed back into service and after any repairs, maintenance or recalibration is performed on a meter;[26] and
- meter specific testing if a customer requests such a test.[27]

The Victorian Code does not, however, require these meter families to undergo Initial In-Service compliance testing. Rather they are deemed by the Victorian Code to have an initial field life of 15 years.[28] These meter families are also not required to undergo FLE testing, unless the meter families are to be left in operation beyond their initial life of 15 years, in which case they are subject to FLE testing on an annual basis.[29]

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[25] Testing is carried out in this year because the Victorian Code requires the ESC to be advised at least three months before the expiry date of the initially determined meter life if it is to be extended.

[26] Victorian Code, section 7.2.1.

[27] Victorian Code, section 7.2.2. This section of the Code requires AGN to:

- give the customer at least 5 business days' notice (or agree such other mutually convenient time) of when the requested test is proposed to be performed; and
- test a metering installation within 15 business days of a request from an affected party to ascertain whether or not the installation is defective.

This section also allows AGN to seek payment from the affected party of the costs of testing the metering installation and associated costs if the installation is not defective and meets the accuracy standards set out in the Code.

[28] Victorian Code, section 7.2.3(b)(i).

[29] Victorian Code, section 7.2.3.

Unlike domestic meters, the lives of commercial meters are not typically extended beyond 15 years because even small metering inaccuracies at these sites can have a significant effect on unaccounted for gas volumes given the large volumes of gas supplied to these sites.

The requirement to carry out annual FLE testing also acts as a barrier to extending the life of these meters, because the cost of carrying out the testing is quite high and, in some cases, the removal of the meter interrupts the individual customer's business. FLE testing is not therefore commonly carried out on these meter families.

The remainder of this section provides further detail on the acceptance testing that is carried out on these meter families.

Acceptance Testing for Commercial Meters

Like domestic meters, new and refurbished commercial meters are generally supplied by accredited manufacturers and tested by the manufacturer or refurbisher to an accuracy of at least ±1% prior to delivery.

Meters received from these manufacturers and refurbishers are sealed prior to delivery and accepted without further testing. These meters are inspected on delivery to ensure the seals are intact and no damage has occurred during transit. If the inspection is satisfactory, the meters are accepted without further testing, prior to installation.

If meters are received from a non-accredited manufacturer, they will be tested before being placed into the field using the following criteria set out in the Victorian Code:[30]

- all diaphragm meters are tested at both 20% and 100% flow rate and must be accurate to ±1%; and
- rotary and turbine meters are tested at 20% and 100% capacity and must be accurate to ±1%.

New meters that are not within the current network experience history, will be tested initially at five points across the range of flow to gain confidence in their use.

2.3.2. Meter Replacement

We are required by the Victorian Code to replace meters on the following basis:

- *meters sized ≤25m³ per hour* – these meter families must be replaced if the test results fall outside the accuracy range specified in the Victorian Code;[31] and
- *meters sized >25m³ per hour* – these meter families are replaced once the meter family reaches 15 years of age, unless the meter family has passed an FLE test.[32]

Where feasible, we will use refurbished meters when carrying out the PMCs because while these meters have a shorter average life, they are a lower cost option than new meters (see Section 4.3 for more detail). There are, however, limits on the availability of refurbished meters (i.e. because there are only a certain number of meters that are removed from the field each year that are economically viable to repair). The current limit for refurbished domestic meters is around 25,000 meters per annum.

Our approach to identifying the number of meters required to be replaced is detailed in Figure 2.1. As described in this figure, we may bring forward the replacement of meter populations to manage

[30] Victorian Code section 7.2.3(b)(iii).

[31] Victorian Code, section 7.2.3a(v).

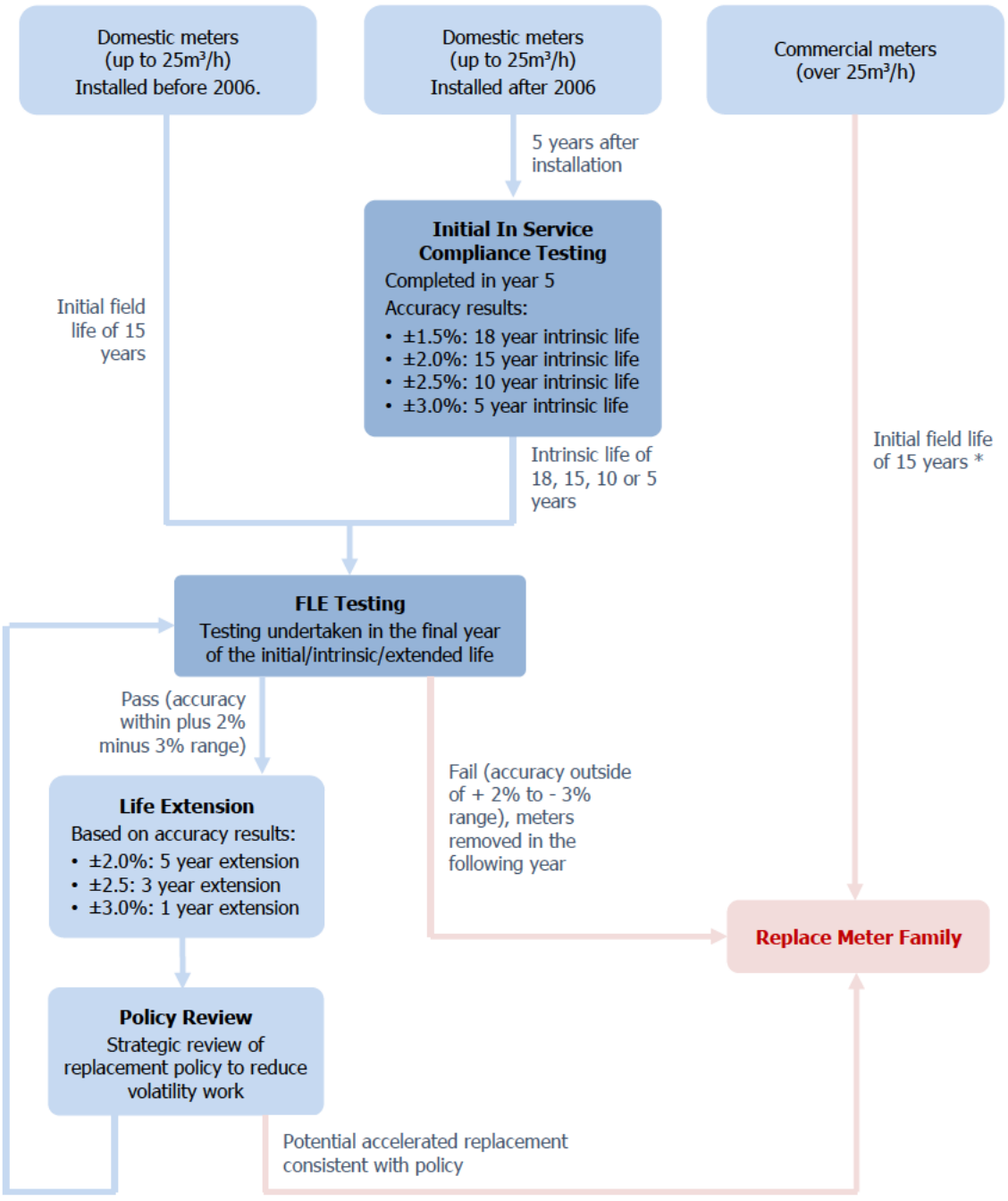
[32] Victorian Code, section 7.2.3.

deliverability risk, minimise the cost of the replacement and ensure compliance with regulatory obligations. The process by which this occurs is outlined in Chapter 4.

Finally, it is worth noting that meters that are removed from service as part of the meter testing or replacement process may be either:

- repaired, tested and returned to service where it is economic to do so; or
- disposed of if it is uneconomic to repair the meters or parts are no longer available.

Figure 2.1: Meter Replacement Identification Process



* Commercial meters are typically replaced at the end of their initial field life, but in those small number of cases where the field life is extended the meters will be subject to FLE testing on an annual basis.

3. Meters in the Victorian and Albury Networks

This chapter sets out:

- the numbers and types of meters currently installed in the Victorian and Albury networks;
- the results of the testing that has recently been carried out in these networks; and
- the meter replacements that have been undertaken (or are expected to be undertaken) in the current (2013 to 2017) Access Arrangement period in the networks.

3.1. Meter Types

We currently reticulate gas to approximately 650,000 customers in our networks. Each customer has a meter installed at their premises. Table 3.1 provides a breakdown of the number of meter types, meter families (meter populations) and meters installed in the networks.

Table 3.1: Split of Meters Installed in Victorian and Albury Networks (as at 30 June 2016)

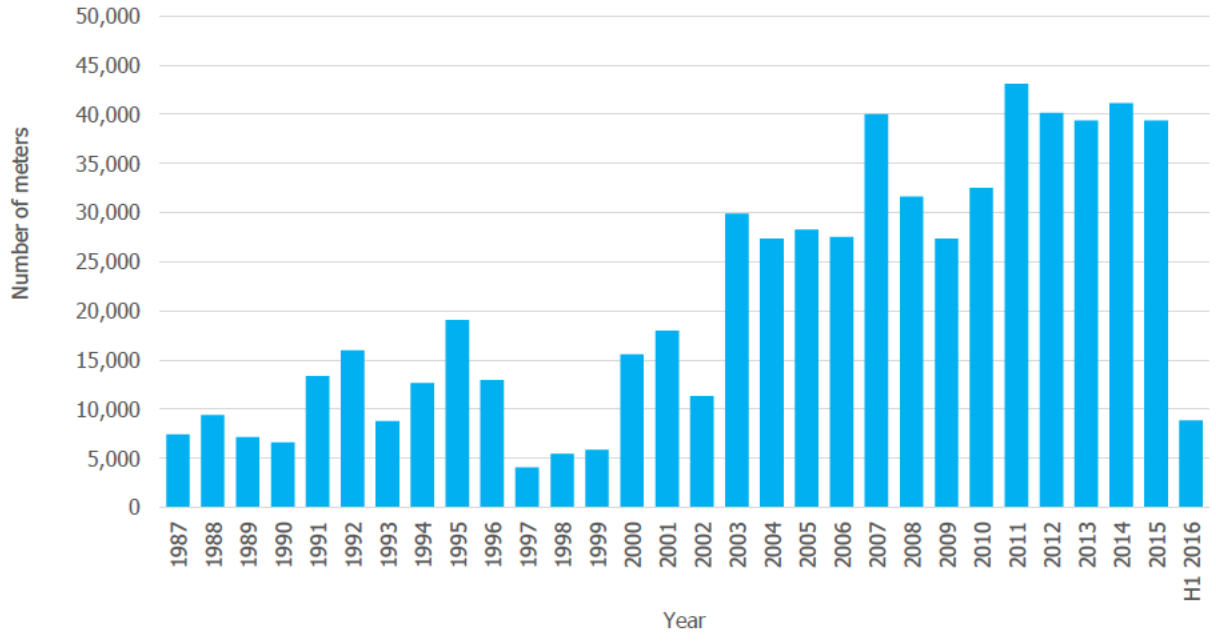
	Domestic (Capacity ≤ 25m^3 /h)	Commercial (Capacity >25m^3 /h)	Total
Number of meter types	18	107	**125**
Number of meters	630,305	20,584	**650,889**

The age profile of the domestic and commercial meters that were installed as at 30 June 2016 is set out in Table 3.2, while Figures 3.1 and 3.2 provide further detail on the year these meters were installed.

Table 3.2: Age Profile of Meters (as at 30 June 2016)

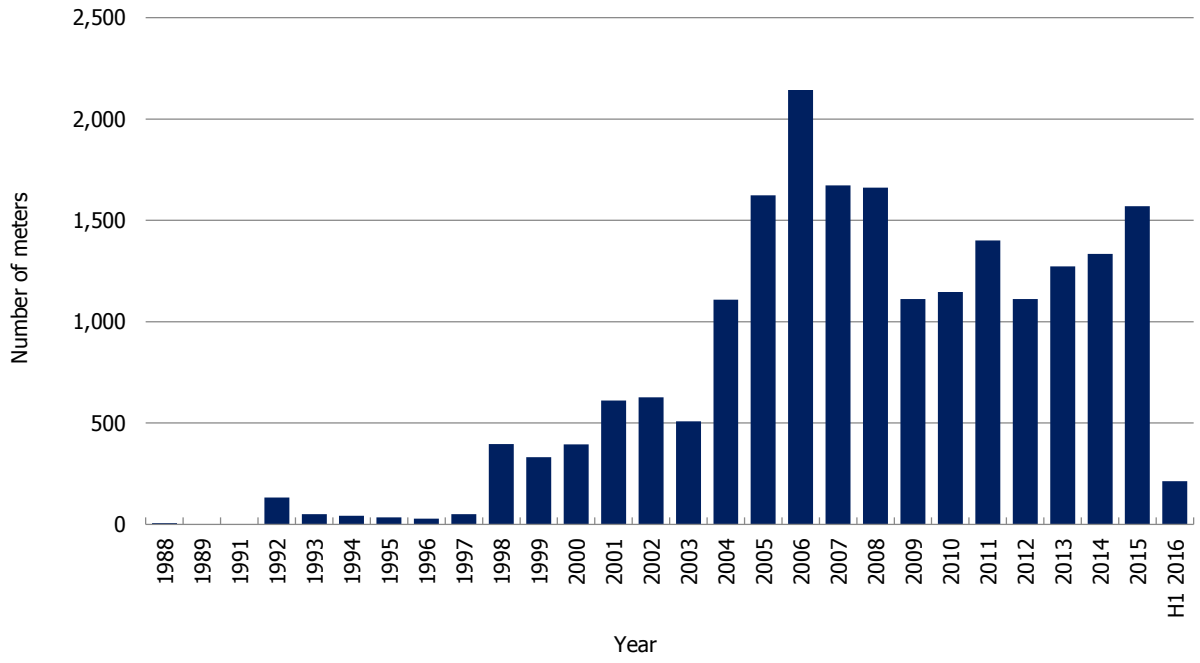
Age	Domestic (Capacity ≤ 25m³ /h)	Commercial (Capacity >25m³ /h)
0-6 years	231,772	5,501
6-7 years	34,807	1,400
7-8 years	38,413	1,146
8-9 years	30,218	1,112
9-10 years	27,747	1,661
10-11 years	29,656	1,672
11-12 years	30,377	2,143
12-13 years	14,005	1,623
13-14 years	23,905	1,109
14-15 years	18,136	508
15+years	151,269	2,709
Total	**630,305**	**20,584**
Average Age	**10.4 years**	**8.1 years**

Figure 3.1: Year of Installation – Domestic Meters (Capacity ≤25m³ per hour) as at 30 June 2016



Note: Average age of meters as at June 2016: 10.4 years.

Figure 3.2: Year of Installation – Commercial Meters (Capacity >25m^3 per hour) as at 30 June 2016



Note: Average age of meters as at June 2016: 8.1 years.

As Figure 3.1 and 3.2 highlight, growth in the Albury and Victorian networks over the 2003 to 2007 period resulted in a significant increase in the number of domestic and commercial meters installed in this period which, in the case of the domestic meters, has largely been maintained.

This growth means that a greater number of domestic PMCs will need to occur in the upcoming AA period to comply with In-Service Compliance and FLE testing requirements set out in AS 4944. A greater number of commercial PMCs will also be required if AGN is to comply with the 15 year standard life assumptions in the Victorian Code.

3.2. Meter Testing Results

3.2.1. Test Results for Meters ≤25m^3 per hour

As noted previously, the Victorian Code requires meters to be sampled and tested for accuracy, with the results of those tests being used to determine the life and forecast replacement date for the wider meter family (population).

In keeping with the testing requirements in AS 4944 and the Victorian Code, AGN has an obligation to test (or cause to be tested) the performance of these meters in the following ways:[33]

- new meters must be subject to acceptance testing before they are placed into service;
- Initial In-Service Compliance testing must be conducted on each meter family (population) installed from 2006 onwards within three to five years of the meter family being installed in the field; and

[33] Testing must also be carried out if requested by a customer.

- FLE testing must be conducted to determine whether or not a meter family's field life can be extended beyond the initial meter life, which is typically 15 years.[34]

The remainder of this Chapter provides an overview of the results of the acceptance testing, Initial In-Service Compliance testing and the FLE testing that has been conducted in the last five years.

3.2.1.1. Acceptance Testing

Manufacturers with accredited testing facilities are required to test the accuracy of new meters to a standard of ±1% prior to delivery. The new meters supplied by manufacturers over the last five years have fallen well within the ±1% accuracy range.

3.2.1.2. Initial In-Service Compliance Testing

To carry out the Initial In-Service Compliance testing, a random sample of meters from the relevant meter family must be removed from the field and tested to determine the initial meter life. This testing is usually carried out in the fifth year of the service life.

The results of the testing that has been carried out over the last three years are set out Table 3.3. As this table shows, 12 meter families have been tested in the last three years, of which:

- four have been accorded an initial meter life of 18 years;
- seven have been accorded an initial meter life of 15 years; and
- one has been accorded an initial meter life of 10 years.

Table 3.3: In-Service Compliance Meter Family Testing Results for the Current AA Period

		2013-14	2014-15	2015-16
No. of meter families tested		4	5	3
Meters passing:	18 year compliance period	2	2	0
	15 year compliance period	1	3	3
	10 year compliance period	1	0	0
	5 year compliance period	0	0	0

3.2.1.3. FLE Testing

In a similar manner to the Initial In-Service Compliance testing, FLE testing requires a random sample of meters from the relevant meter family to be removed from the field and tested to determine whether the life of the meter family can be extended beyond the meter family's initial service life. The FLE test is usually carried out in the final year of the meter family's designated service life.

Table 3.4 sets out the results of the FLE testing that has been conducted over the last three years. As this table shows, 43 meter families have been subject to FLE testing over this period, of which:

- nine were accorded a five year extension (the average age of the families granted this extension was 15 years);
- 15 were accorded a three year extension (the average age of the families granted this extension was 19 years);

[34] Victorian Code, section 7.2.3

- 13 were accorded a one year extension (the average age of the families granted this extension was 17 years); and
- six failed the test (the average age of the families that failed the accuracy test was 15 years).

The other important point to note from this table is that the number of meter families failing the FLE testing has increased in the last three years and in most cases has occurred on meters that are 14 to 15 years of age. It is too early at this stage to say whether this trend will continue, but if it does then it suggests that the newer meters are not as reliable as they have been in the past.

Table 3.4: FLE Meter Family Testing Results for the Current AA Period

		2013-14	2014-15	2015-16
No. of meter families tested		15	17	11
Families passing:	5 year extension criteria	2	5	2
	3 year extension criteria	6	6	3
	1 year extension criteria	6	5	2
Families failing extension criteria		1	1	4

3.2.2. Test Results for Meters >25m^3 per hour

As outlined in Section 2.3.1, the only testing that commercial meters must undergo is: [35]

- assurance testing, which must be carried out on new and refurbished meters before they are placed into service; and
- FLE testing, if the life of the meters is to be extended beyond the 15 year life set out in the Victorian Code.

Over the last five years there has not been any FLE testing of these meters. The only testing that has therefore been carried out is assurance testing on new meters.

Like the manufacturers of smaller meters, manufacturers of larger meters with accredited testing facilities are required to test the accuracy of the larger meters to a standard of ±1% prior to delivery. Over the last five years the new meters provided by manufacturers over the last five years have fallen well within the ±1% accuracy range.

[35] Testing must also be carried out if requested by a customer.

4. Meter Replacement Policy

This chapter provides an overview of the meter replacement policy that we intend to employ in the next AA period. A more detailed discussion on how the meter replacement forecast for the next AA period has been calculated and how it will be delivered is provided in the following chapter.

4.1. Meter Replacement Policy

The overarching objectives of AGN's meter replacement policy are to ensure compliance with the regulatory obligations set out in Chapter 2 and carry out the meter replacement program in the most prudent and efficient manner by:

- minimising the level of inter-year variability in program size and, in so doing, minimising the unit rates and program delivery risks;
- maximising the use of refurbished meters in the meter replacement program, which can be more cost effective to install than new meters; and
- using testing facilities and contractors that have been selected through a competitive tender process (for more information relating to our proposed unit rates for the next AA period, please refer to Attachment 8.4 Unit Rates Forecast of our Final Plan).

Further detail on the processes AGN has put in place to minimise the costs and risks associated with the meter replacement program are set out below.

4.2. Minimising Inter-Year Variations in Program Size

The age profile of the current stock of meters is, as highlighted in Figures 3.1 and 3.2, quite lumpy and will give rise to a significant degree of inter-year variability in the number of meters that need to be tested and replaced. For example, in the next AA period, compliance with the testing and meter replacement obligations is expected to result in the annual number of meter replacements for:

- domestic meters fluctuating between 17,760 meters and 52,725 meters; and
- commercial meters fluctuating between 508 meters and 2,143 meters.

The degree of inter-year variation can be seen more clearly in Figures 4.1 and 4.2 (note the process by which the forecasts presented in these figures were developed is described in detail in Chapter 5).

Figure 4.1: Meters of size ≤25m^3 per hour Forecast to be Replaced

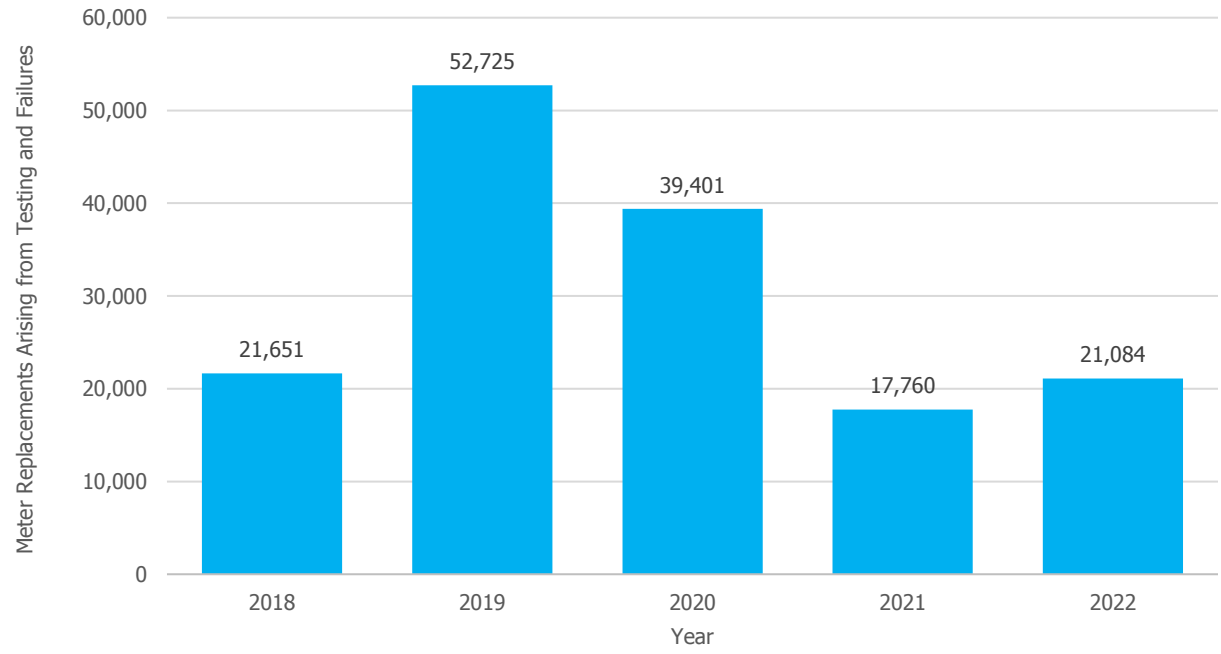
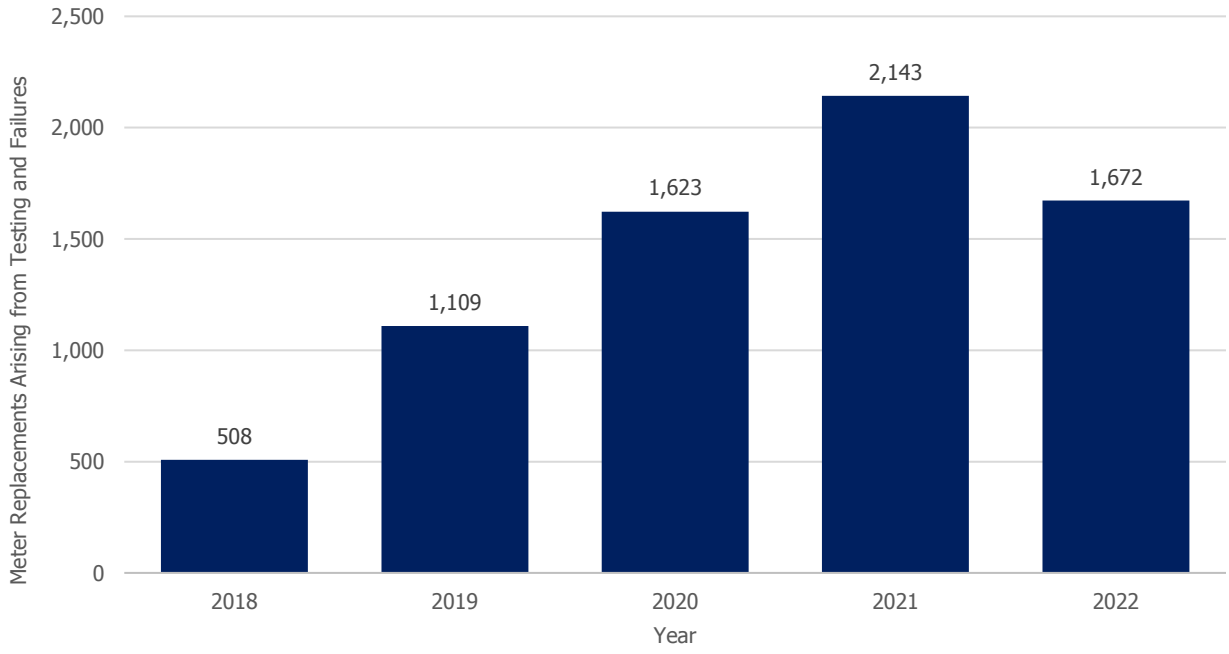


Figure 4.2: Meters of size >25m^3 per hour Forecast to be Replaced



As these figures show, the inter-year variability can be quite significant, which can place upward pressure on the internal[36] and external costs of carrying out the program because of the costs

[36] Internal costs will increase because additional resources will need to be used to plan, schedule and co-ordinate the program.

associated with mobilising and demobilising resources on a year-to-year basis and constraints on the availability of:

- *Refurbished and new meters* – To minimise the cost of the meter replacement program, a large proportion of the replacement meters in our networks are refurbished and reused. There is, however, a limit on the availability of refurbished meters of around 25,000 meters per annum from the supplier. So if the number of meters that needs to be replaced in a year exceeds 25,000, new meters will need to be installed, which are approximately 35% more expensive than refurbished meters. If the number of new meters to be installed in a particular year are too high, then we may also experience constraints trying to procure new meters, which could drive up the price of these meters.
- *Gas fitting services* – For large programs (e.g. those above 45,000 PMCs per year), there is a risk that the demand for skilled labour will outstrip supply (particularly in Victoria where there are three gas distribution businesses requiring services), which will negate any benefit that may be expected from economies of scale.
- *Internal labour* – internal resources are used to plan, schedule and co-ordinate the meter replacement program, so if the number of meters to be replaced in a particular year substantially exceeds the average, then additional resources will need to be dedicated to this task. There are, however, constraints on the availability of internal labour, so in peak years contractors may need to be engaged to supplement the internal work force, which will give rise to additional costs (e.g. to train the staff and to potentially work over time to complete the program).

Constraints on the availability of meters, gas fitting services and internal labour, can also give rise to a range of program delivery risks, the most significant of which being non-compliance with the regulatory obligations set out in the Victorian Code, the NSW Regulation and the National Measurement Act. If we fail to comply with these obligations then we may incur penalties, or be subject to a range of other compliance actions (see Section 2.3).

Given the costs and risks inherent in a volatile replacement program and the growing fleet of meters in our networks, we are of the view that a sustainable range for meter replacements in the next AA period is:

- 26,000 to 40,000 meter replacements per annum for domestic meters; and
- 1,300 to 1,800 meter replacements per annum for commercial meters.[37]

The lower bound of this range is based on the age of our current stock of meters and an assumed average life for domestic and commercial meters. The upper bound, on the other hand, is based on our experience in delivering large scale programs and reflects the additional costs and risks that can be faced if programs in excess of this level are carried out.

[37] This range has been calculated by dividing the current stock of these meters (~20,584) by the assumed average life of 15 years.

Figure 4.3: Sustainable Band of Replacement for Meters of size ≤25m³ per hour

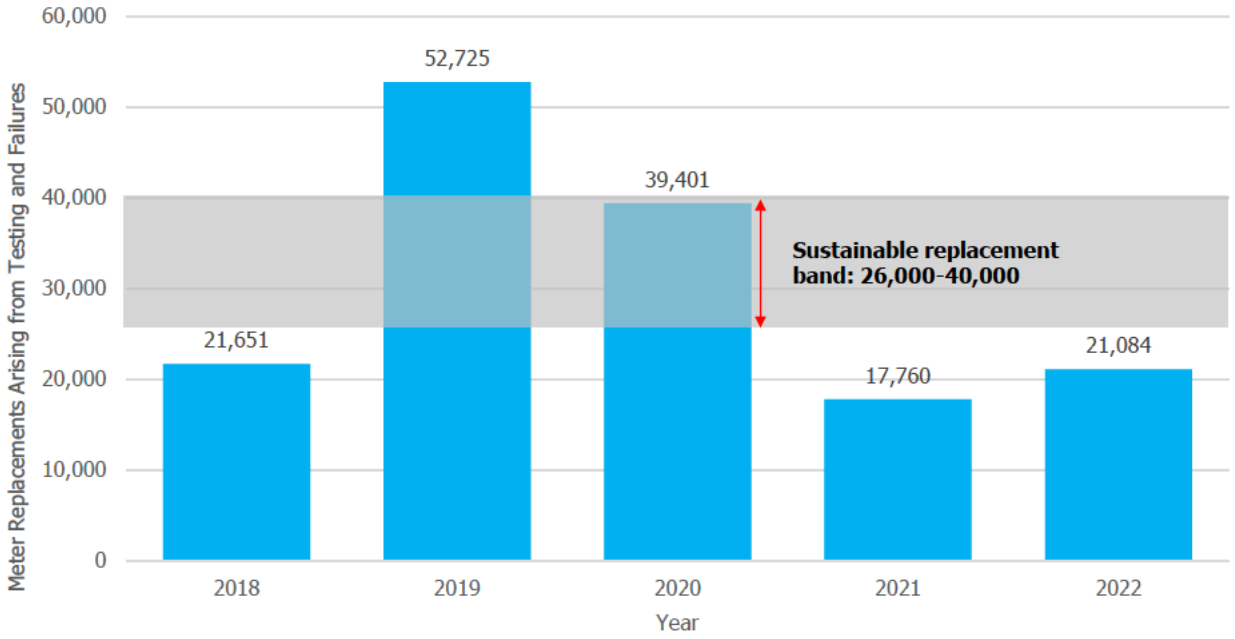
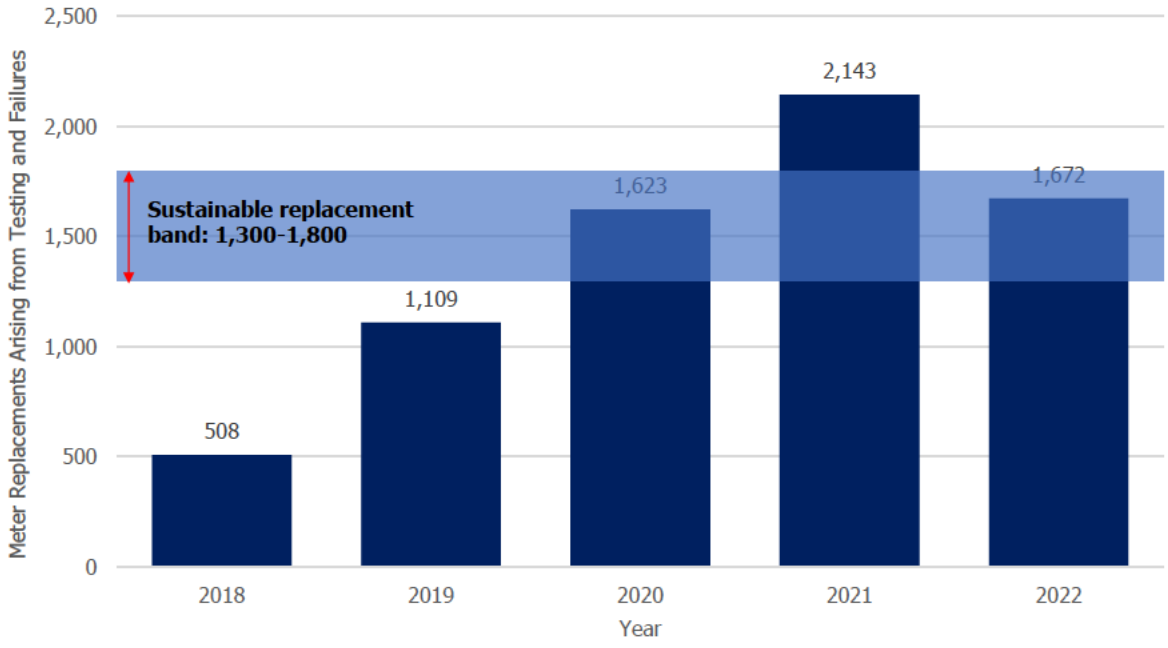


Figure 4.4: Sustainable Band of Replacement Meters of size >25m³ per hour



To reduce the degree of inter-year variability and the costs and risks associated with such variability, some degree of smoothing is required. In contrast to other forms of capex, our regulatory obligations under the Victorian Code, the NSW Regulation, AS 4944 and the National Measurement Act, mean that smoothing can only be achieved by bringing forward the replacement of meter families before the end of their deemed useful life. There are therefore some constraints on the extent to which we can smooth the PMC program over an AA period.

4.3. Minimising Costs through the Use of Refurbished Meters

AGN replaces meters with a combination of new and refurbished meters. A cost comparison between a new meter and a refurbished domestic meter shows that there is a per meter saving of approximately 35% when refurbished meters are used. The reduction in anticipated service life between a new and a refurbished meter is 21% (24 years versus 19 years), which means that the overall cost saving of using a refurbished meter is around 19%.

As noted previously, the volume of domestic refurbished meters is limited by the available facilities that are capable of meter refurbishment, and currently sits around 25,000 per annum. The ability to maximise the use of refurbished meters will therefore depend on the profile of PMCs.

4.4. Use of Competitive Tender Processes

To ensure the testing and meter replacements are carried out in the most efficient manner, we have entered into contracts with a series of services providers. These contracts have all been entered into as a result of competitive tender processes. Further detail on these contracts can be found in the Unit Rates Report, provided as Attachment 8.4 to our Final Plan.

5. Forecast Meter Replacement Program

This chapter sets out our forecast of the amount to be spent on domestic and commercial PMCs in the Victorian and Albury networks over the next AA period to comply with our regulatory obligations.

In developing these forecasts, we have had regard to the regulatory obligations set out in the Victorian Code, the NSW Regulation, AS 4944 and the National Measurement Act. We have also had regard to:

- Rule 79 of the NGR, which requires the capex to be:
  - such as would be incurred by a prudent service provider acting efficiently in accordance with accepted good industry practice to achieve the lowest sustainable cost of providing this service; and
  - justifiable on one of the following grounds set out in Rule 79(2) of the NGR:
    - a the overall economic value of the expenditure is positive; or
    - b the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure; or
    - c the capital expenditure is necessary:
      - i to maintain and improve the safety of services; or
      - ii to maintain the integrity of services; or
      - iii to comply with a regulatory obligation or requirement; or
      - iv to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or
    - d the capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c); and
- Rule 74 of the NGR, which states that any forecast or estimate must be arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

5.1. Forecasting Approach

To develop the forecasts for the next AA period, we have taken the following steps:

Step 1. **Forecast the number of PMCs for meters sized ≤25m³ per hour to occur in the next AA period:** Using information on the age of the meters with a capacity of up to 25m³ per hour that are expected to be in place as at 1 January 2018 and prior testing results, we have developed a forecast of:

- the number of Initial In-Service Compliance tests that will be required over the next AA period;
- the number of FLE tests that will be required over the next AA period and the extensions that will flow from this testing;

- the number of meters that will fail the FLE testing and require replacement in the next AA period; and
- the number of defective[38] meters that will need to be replaced on a reactive basis in the AA period.

Step 2. **Forecast the number of PMCs for meters sized >25m^3 per hour to occur in the next AA period**: Using information on the age of the meters with a capacity in excess of 25m^3 per hour that are expected to be in place as at 1 January 2018, we have developed a forecast of the number of meters that will reach the age of 15 and require replacement in the next AA period:

Step 3. **Minimise the degree of inter-year variability in the PMC program**: Subject to the constraints posed by our regulatory obligations, we have sought to minimise the degree of inter-year variability by smoothing the replacement profile over the next AA period.

Step 4. **Calculate the forecast cost of the PMC program in the next AA period**: Using the smoothed meter replacement profile derived in Step 3 and the unit rates set out in the Unit Rates Report (see Attachment 8.4 to our Final Plan), we have calculated the forecast cost of the PMC program in the next AA period.

Each of these steps are discussed in further detail below.

5.2. Step 1: Forecast PMCs for Meters ≤25m^3 per hour

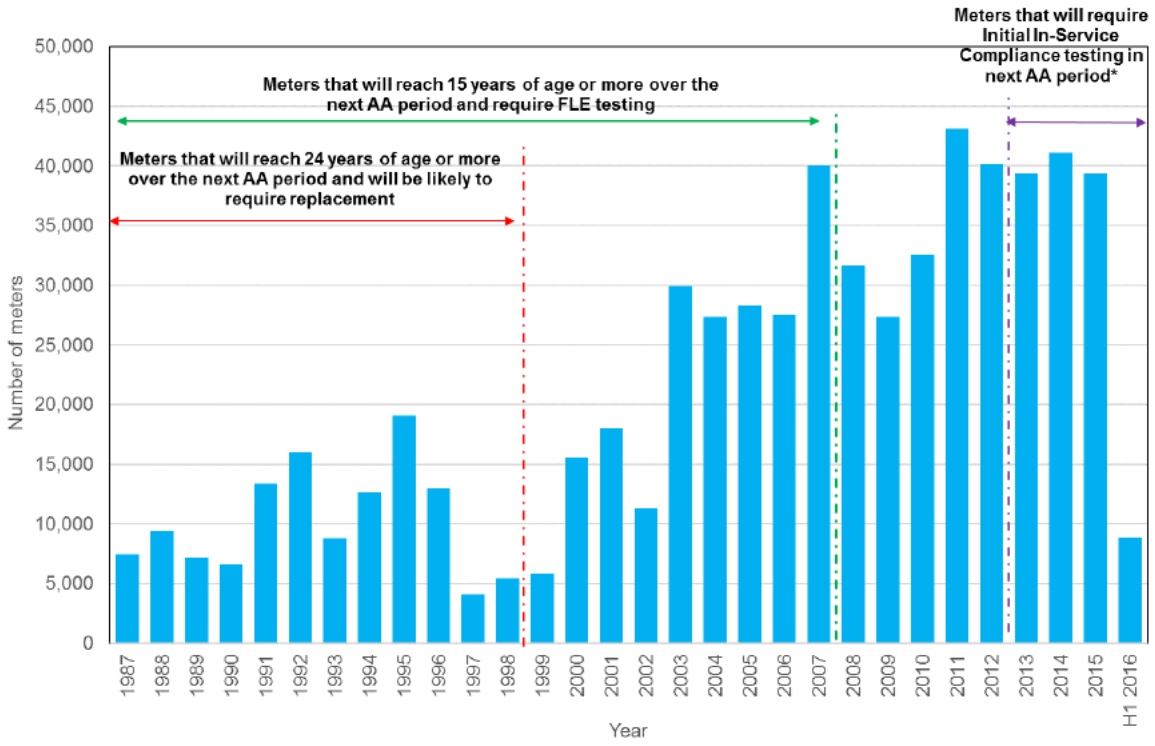
To forecast the number of PMCs that will be required in the next AA period for meters with a capacity of up to 25m^3 per hour, consideration must be given to:

- the number of Initial In-Service Compliance tests that will be required in the period;
- the number of FLE tests that will be required in the period and the field life extensions that will flow from this testing;
- the number of meters that are likely to fail the FLE testing and require replacement in the period; and
- the number of defective meters that will need to be replaced on a reactive basis in the period.

Some insight into the number of meters that are likely to require testing and replacement in the next AA period can be found in Figure 5.1. As this figure shows, a greater number of Initial In-Service Compliance and FLE testing is likely to be required in upcoming AA periods than has been required in the past given the substantial growth in the meter fleet since 2003.

[38] The term defective is used in this context to distinguish these meters from those that are replaced because the meter family is no longer providing an accurate measure of the volume of gas consumed.

Figure 5.1: Age Profile of Meters ≤25m³ per hour



Note: * Excludes meters installed in 2017 and the second half of 2016. Average age of meters as at June 2016: 10.4 years.

5.2.1. Initial In-Service Compliance Testing

To forecast the number of Initial In-Service Compliance tests that will be required in the next AA period, we have assumed the testing is carried out in the fifth year the meter population came into service.[39] Using this assumption, as well as information on the age of the meters and the sample size requirements set out in Table 1 of AS 4944,[40] we have estimated that 10,332 meters will need to be removed from the field during the next AA period and subject to Initial In-Service Compliance testing (see Table 5.1). Further detail on how we arrived at this estimate can be found in Appendix A.

Table 5.1: Victorian and Albury Networks: Initial In-Service Compliance Testing

	2018	2019	2020	2021	2022*	Total
Number of Meters to be Tested	[redacted]					10,332

Note: Totals may not add due to rounding
* The number of Initial In-Service Compliance Testing in 2022 is based on an estimate of the number of meters that will be installed in 2017.

[39] As an example, there are 5,765 meters from the U10 pattern installed in 2015. An Initial In Service life test of 230 of these meters will be required by 2020.

[40] Given the potential for meters to be damaged when they are removed or transported to the testing site, or for other factors to prevent testing, we have assumed that an additional 15% of meters from each family will need to be removed from the field for testing.

5.2.2. FLE Testing

In contrast to Initial In-Service Compliance testing, FLE testing is harder to predict because meters do not deteriorate (fail meter testing) in a standardised and predictable manner, as highlighted in section 3.2.1.3. Some assumptions must therefore be made about when the FLE tests will be required.

For those meters that have not previously been subject to any form of in-service testing (i.e. Initial In-Service Compliance or FLE testing), we have assumed the following:

- the initial service life of newly manufactured meters is assumed to be 15 years and meter accuracy is assumed to deteriorate through successive FLE tests as follows:
  - the first FLE test is assumed to be conducted in year 14 and result in a five year extension;
  - the second FLE test is assumed to be conducted in year 19 and result in a three year extension;
  - the third FLE test is assumed to be conducted in year 22 and result in a one year extension; and
  - the fourth FLE test is assumed to be conducted in year 23 and result in no further extensions (i.e. it is assumed to fail the test) with the meter family removed at the end of year 24; and
- the initial service life of refurbished meters is assumed to be 15 years and meter accuracy is assumed to deteriorate through successive FLE tests as follows:
  - the first FLE test is assumed to be conducted in year 14 and result in a three year extension;
  - the second FLE test is assumed to be conducted in year 17 and result in a one year extension; and
  - the third FLE test is assumed to be conducted in year 18 and result in a one year extension; and
  - the fourth FLE test is assumed to be conducted in year 19 and result in no further extensions (i.e. it is assumed to fail the test) with the meter family removed at the end of year 19.

Where the meter family has been subject to an in-service test, we also assume that metering accuracy will deteriorate through successive FLE tests, but the timing of the subsequent FLE tests for that meter family will depend on the results of the last test.[41]

Using these assumptions, as well as information on the age of the assets that will be in stock as at 1 January 2018, the results of previous Initial In-Service Compliance and FLE testing and the sample size requirements set out in Table 1 of AS 4944, we have estimated that 16,556 meters from these meter families will need to be removed from the field and subject to FLE testing in the

[41] For example, if a new family meter is installed and through the Initial In-Service Compliance test was granted an 18 year life then first FLE test would be assumed to be conducted in year 17. If the first FLE test has already been carried out and indicated that the life could be extended by three years, then the next FLE test would be assumed to occur in year 20 of the meter family's life. If, however, the first FLE test has not been conducted, then in a similar manner to that described above, the meter family will be assumed to be subject to four FLE tests, with the first resulting in a five year extension, the second a three year extension, the third a one year extension and the fourth resulting in the meter failing the prescribed tolerance band.

next AA period (see Table 5.2).[42] Further detail on how we arrived at this estimate can be found in Appendix A.

Table 5.2: Victorian and Albury Networks: FLE Testing

	2018	2019	2020	2021	2022	Total
Number of Meters to be Tested	[redacted]					16,556
Number of Families	25	11	9	15	17	72

Note: Totals may not add due to rounding.

5.2.3. Meters that are Forecast to Fail the FLE test in the Period

The number of meters that will need to be replaced in a particular year because the meter family's accuracy no longer falls within the prescribed tolerance band, will depend on the results of the previous year's FLE testing, with meters that fail this testing being removed from service in the following year.

To estimate the number of meters that will fail the FLE in the next AA period, an assumption has to be made about the average life of these meters. For meters that have not previously been subject to any form of in-service testing, we have assumed that:

- newly manufactured meters have a 24 year life (i.e. an initial service life of 15 years plus three FLE extensions totaling nine years);[43] and
- refurbished meters have a 19 year life (i.e. an initial service life of 15 years plus two FLE extensions totaling four years).

For meters that have previously been subject to Initial In-Service Compliance and/or FLE testing, the life of the meters will be informed by the results of the last tests that were conducted.

It is noteworthy that as described in Section 3.2.1.3, the number of meter families failing the FLE testing has increased in the last three years and in most cases has occurred on meters that are 14 to 15 years of age.

Using these assumptions, as well as information on the age of the assets that will be in stock as at 1 January 2018 and prior test results, we have estimated that 105,733 meters will need to be removed from the field during the next AA period because they fail the FLE testing (see Table 5.3). Further detail on how we arrived at this estimate can be found in Appendix A.

Table 5.3: Victorian and Albury Networks: Meters Replaced Due to Failure of FLE Testing

	2018	2019	2020	2021	2022	Total
Meters to be replaced	[redacted]					105,733

Note: Totals may not add due to rounding.

[42] As an example, the meter pattern Email 602 installed in 1989 was tested in 2014 and received a FLE of three years at that time. The next test of this family is required in 2017, with 230 meters to be removed and tested.

[43] It is noteworthy that as described in Section 3.2.1.3, the number of meter families failing the FLE testing has increased in the last three years and in most cases has occurred on meters that are 14 to 15 years of age, meaning these meters are being removed from service at an age of around 15 years, less than the 24 year life assumed to develop these forecasts. The basis of this meter replacement forecast can therefore be considered conservative.

5.2.4. Reactive Replacements of Defective Meters

In addition to having to replace meter families that no longer satisfy the prescribed tolerance band for metering accuracy, there are occasions where individual meters become defective and require replacement. This is referred to as 'reactive replacement'.

Historically, around [redacted] meters per annum have had to be replaced on this basis. Provision has therefore been made in the forecast for an equivalent number of reactive replacements to occur over the next AA period.

Table 5.4: Victorian and Albury Networks: Reactive Replacements

	2018	2019	2020	2021	2022	Total
Meters to be replaced	[redacted]					20,000

Note: Totals may not add due to rounding.

5.2.5. Summary of Forecast Number of PMCs for Meters ≤25m³ per hour

The total number of PMCs for meters sized ≤25m³ per hour that are forecast to be required in the next AA period in the Victorian and Albury networks are set out in Table 5.5.

Table 5.5: Victorian and Albury Networks: PMC Forecast for Meters Sized ≤25m³ per hour

	2018	2019	2020	2021	2022	Total
Initial In-Service testing	[redacted]					10,332
FLE testing	[redacted]					16,556
Meters requiring replacement after failing FLE testing	[redacted]					105,733
Reactive replacements of defective meters	[redacted]					20,000
Total	[redacted]					152,621

Note: Totals may not add due to rounding.

The number of PMCs that are forecast to occur in this period is approximately 6% higher than the number that were replaced in the current AA period. This increase can largely be attributed to the growth in the number of domestic meters that have been installed in the Victorian and Albury networks since 2003 (see Figure 3.1), which means that a greater number of In-Service Compliance and FLE tests will be required in the next AA period than have been required to date.

5.3. Step 2: Forecast PMCs for Meters >25m³ per hour

To forecast the number of meters of size >25m³ per hour that will need to be replaced in the next AA period, we have assumed that these meters will be replaced at the end of their 15th year of service, consistent with the standard life set out in the Victorian Code (see Section 2.3.1.2 for more detail). The commercial meters that will reach this age in the next AA period are the meters that were installed 2003 and 2007, which total 7,055 meters (see Table 5.6) and assumed these

will be replaced in the next AA period.[44] Further detail on how we arrived at this estimate can be found in Appendix A.

Table 5.6: Victorian and Albury Networks: PMCs for Meters Sized >25m^3 per hour

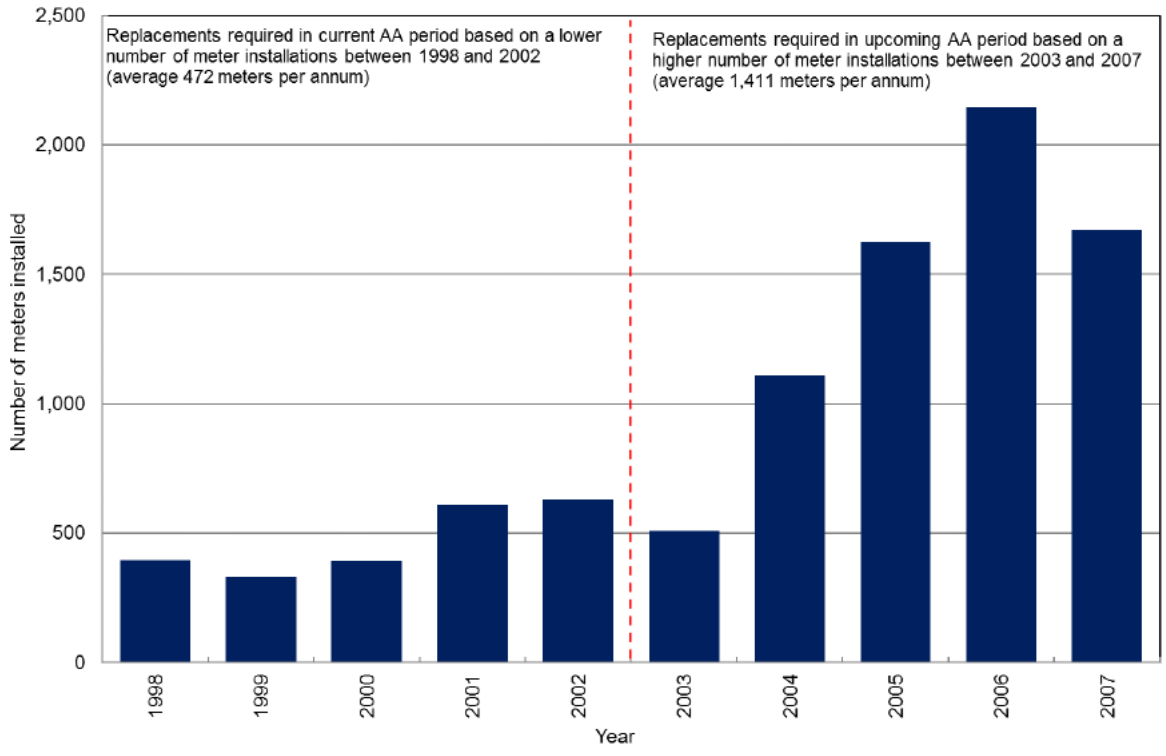
	2018	2019	2020	2021	2022	Total
Meters reaching 15 years of age	[redacted]					7,055

Note: Totals may not add due to rounding.

Like the domestic meter forecast, this forecast exhibits a significant degree of variability over the AA period, ranging from [redacted] to [redacted] meters.

The number of commercial meters that are forecast to be replaced in the next AA period is around two times the amount that replaced in the current AA period. In a similar manner to domestic meters, this increase stems from the growth in the number of commercial meters that were installed in the 2003 to 2007 period. This growth can be seen in Figure 5.2, with the number of meters installed in the 2003 to 2007 period being around three times higher than what occurred in the 1998 to 2002 period (7,055 versus 2,360). It is not surprising therefore that a greater number of these meters will need to be replaced in this period.

Figure 5.2: Meters > 25m^3 per hour Installed 1998 to 2007



[44] For example, in 2018 the number of meters that will need to be replaced is equal to the number of meters that were installed in 2003 that are still in operation (i.e. [redacted]

5.4. Step 3: Minimise the Degree of Inter-Year Variability

The total number of domestic and commercial PMCs that are forecast to be required in the Victorian and Albury networks in the next AA period are set out in Table 5.7.

Table 5.7: Victorian and Albury Networks: Meter Replacement Forecast (Unsmoothed)

	2018	2019	2020	2021	2022	Total	Five Year Average
Domestic meters	[redacted]					152,621	30,524
Commercial meters	[redacted]					7,055	1,411
Total	[redacted]					159,676	31,935

Note: Totals may not add due to rounding.

As this table highlights, the forecast exhibits a significant degree of variability, with the number of PMCs to be conducted in each year of the AA period ranging from [redacted] to [redacted]. As outlined in Section 4.2, carrying out a program with this degree of inter-year variability can be more costly to implement because of the costs associated with mobilising and demobilising resources on a year-to-year basis and constraints on the availability of refurbished meters, gas fitting services and internal labour. It can also give rise to a range of program delivery risks, the most significant of which being non-compliance with the regulatory obligations set out in the Victorian Code, the NSW Regulation, AS 4944 and the National Measurement Act. We have therefore sought to minimse the degree of inter-year variability in the PMC forecasts.

Before setting out the smoothed profile that we have adopted for these meters, it is worth reiterating that given the obligations we have under the Victorian Code, the NSW Regulation, AS 4944 and the National Measurement Act, smoothing can only be achieved by bringing forward the replacement of meter families before the end of their deemed useful life. There are therefore some constraints on the extent to which the forecast can be smoothed over the period.

5.4.1. Smoothing the PMC Profile for Meters ≤25m³ per hour

In total, 152,621 PMCs are forecast to be required for meters ≤25m³ per hour in the next AA period, with the peak expected to occur in 2019 and 2020, with approximately 60% of the PMCs forecast to be required in these two years. To put the scale of the peak in these years into perspective, it is worth noting that the number of PMCs that are forecast to be required in these years are 1.3 to 1.7 times higher than the five year average of 30,524 meters. In the other years, the forecast number of PMCs is 60-70% of the average.

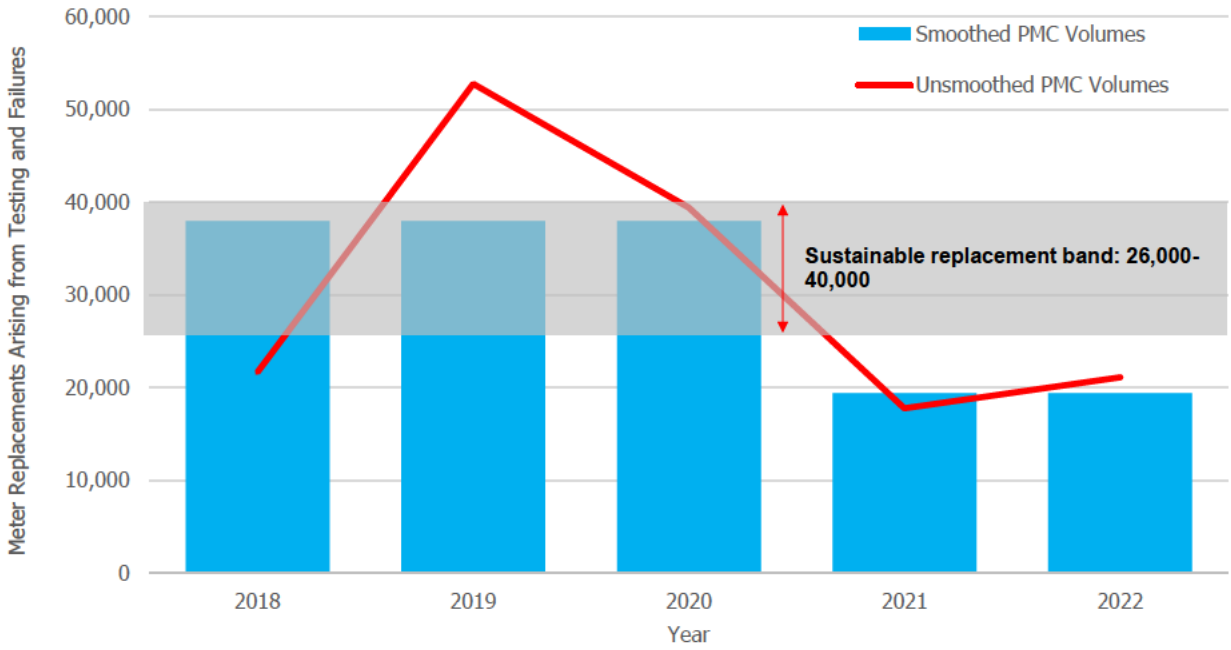
The scale of the peak in 2019 and 2020, coupled with the fact that it is expected to occur so early in the AA period, means that it is not possible to just adopt the five year average (i.e. because to do so would result in us failing to comply with our regulatory obligations in these two years). We have therefore had to use an alternative approach for domestic PMCs.

Given our regulatory obligations, the only way to smooth out the peaks that are expected to occur in 2019 and 2020, is to bring forward some of the replacements into 2018. To do this, we have set the number of replacements in 2018 to 2020 equal to [redacted]. Maintaining this number of replacements over the AA period would result in far more replacements being carried out than are

expected to be required, so the number of replacements in 2021 and 2022 has been set equal to [redacted].

The smoothed profile that we have adopted is illustrated in Figures 5.3 and 5.4.

Figure 5.3: Smoothed versus Unsmoothed ≤25m³ per hour PMC Program Profile



[redacted]

The key points to note from these figures are that smoothing the PMC profile in the manner outlined above will:

- reduce the peak from [redacted] meters to [redacted], which is well within the sustainable band of delivery (see Figure 5.3); and
- ensure that we comply with our regulatory obligations under the Victorian Code, the NSW Regulation, AS 4944 and the National Measurement Act, with the smoothed number of PMCs (measured on a cumulative basis) never falling below the unsmoothed number of PMCs that are forecast to be required in each year of the period (see Figure 5.4).

Smoothing the program in this manner will also enable us to maximise the use of refurbished meters, which in the case of domestic meters are 35% cheaper than new meters.[45] It will also allow us to avoid:

- the additional internal labour costs that would be incurred under the unsmoothed option in 2019 and 2020 to plan, schedule and co-ordinate the higher than average number of PMCs that are forecast to be required in those years;
- the constraints on the availability of new meters that could be experienced under the unsmoothed option in 2019 and 2020 when the meter replacement program is expected to peak, which could drive up the price of new meters beyond the current levels; and
- the penalties that could be incurred under the unsmoothed option in 2019 and 2020 because the risk of non-compliance increases as the scale of the program increases (e.g. due to constraints in labour and meter procurement).

In terms of our ability to deliver this smoothed program, it is worth noting that in the current AA period, the average number of replacements that have been completed in the first three years has averaged around 27,000, but will be rising to around [redacted] in 2017. While the movement to the [redacted] level in 2018 to 2020 represents a [redacted] increase from the 2017 level, it does fall well within the sustainable band of delivery. We are confident therefore that we will be able to access the meters, gas fitting services and internal labour resources that will be required to carry out this number of PMCs in these years.

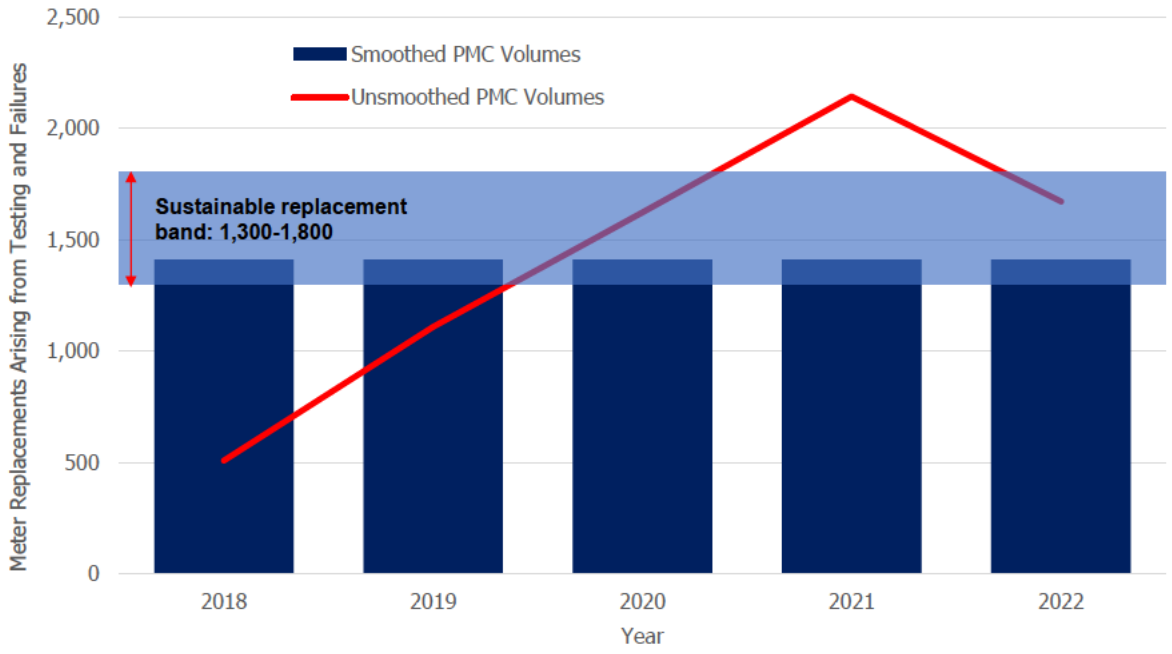
5.4.2. Smoothing the PMC Profile for Meters >25m^3 per hour

Over the next AA period, 7,055 PMCs are expected to be required for meters sized >25m^3 per hour, with the number of PMCs in each year ranging from [redacted] to [redacted]. In contrast to the domestic meters, the peak in commercial PMCs is not expected to occur until the latter part of the AA period. It is therefore much easier to smooth the commercial PMC profile over the AA period.

To smooth the commercial PMC profile, we have used the five year average of the number of commercial PMCs that are forecast to be required in the next AA period ([redacted]) and assumed this is maintained over the entire period. The smoothed profile that we have adopted for commercial PMCs is illustrated in Figure 5.5 Like the domestic PMC profile, the smoothed profile for commercial PMCs falls within the sustainable band of replacement and will also ensure we comply with our regulatory obligations.

[45] Even when the difference between the life of a refurbished and new meter (i.e. 19 years versus 24 years) is taken into account, the refurbished meters are 19% cheaper than new meters.

Figure 5.5: Smoothed versus Unsmoothed >25m³ per hour PMC Program Profile



[redacted]

In a similar manner to the smoothed domestic PMC profile, smoothing the commercial PMC program in the manner described above will enable us to maximise the use of lower cost refurbished meters and to avoid the other costs and risks that may otherwise be faced in the latter part of the AA period when commercial PMCs are expected to peak.

In terms of our ability to deliver the proposed smoothed program, it is worth noting that the average number of replacements that have been completed in the first three years has averaged around 355, but will increase to [redacted] by 2017. Given our recent experience in this area and the fact that the smoothed profile falls within the sustainable band of delivery, we are confident that we will be able to access the meters, gas fitting services and internal labour resources that will be required to carry out the [redacted] per annum commercial PMCs in these years.

5.4.3. Summary

Table 5.8 provides a summary of the smoothed PMC profile that we intend to employ in the next AA period.

Table 5.8: Victorian and Albury Networks – Smoothed PMC Forecast

	2018	2019	2020	2021	2022	Total
≤25m³ per hour						
Sustainable Band of Replacement	26,000-40,000 meters per annum					n.a.
Predicted Number of PMCs (Unsmoothed)	[redacted]					152,621
Smoothed Number of PMCs	[redacted]					152,621
>25m3 per hour						
Sustainable Band of Replacement	1,300–1,500 meters per annum					n.a.
Predicted Number of PMCs (Unsmoothed)	[redacted]					7,055
Smoothed Number of PMCs	[redacted]					7,055
Total program						
Smoothed Number of PMCs	[redacted]					159,676

Note: Totals may not add due to rounding.

As this table shows, employing the smoothed program will:

- reduce the peak in PMCs for meters sized up to 25m³ per hour, from [redacted] in 2019 to [redacted] and bring the program in the peak years into line with the sustainable replacement band (i.e. 26,000 to 40,000 per annum), while also ensuring compliance with our regulatory obligations; and
- reduce the peak in PMCs for meters sized above 25m³ per hour, from [redacted] to [redacted] in 2020 to 2022 to [redacted] and bring the program into line with the sustainable replacement band (i.e. 1,300 to 1,800 per annum), while also ensuring compliance with our regulatory obligations.

Smoothing the PMC program in this manner will also, as noted above, enable us to reduce the costs and risks of delivering the program over the AA period, which is consistent with rule 79 of the NGR as the AER acknowledged in 2012 when considering a similar proposal by AusNet

Services. In this case, the AER found that a smoothed replacement profile was consistent with both rule 74 and rule 79 and in doing so noted the following:[46]

> *"The AER accepts there may be costs involved in mobilising and demobilising a workforce and so considers smoothing is appropriate in some circumstances. In SP AusNet's case, the "early retirement" meters are still removed when the installed lives are at the low end of what the AER considers reasonable. Accordingly the AER accepts that these meters are not being removed from service unreasonably early.*
>
> *The AER considers the volume of meters to be replaced under this program is consistent with r. 74(2) of the NGR and prudent and efficient."*

As such, we considered that our smoothed forecast meter replacement program is consistent with the NGR and with the AER's previously approved approach.

5.5. Calculate the Forecast Cost of the PMC Program

The forecast cost of the PMC program has been calculated by multiplying the forecast number of PMCs by the unit rates set out in the Unit Rates Report, provided as Attachment 8.4 to our Final Plan. In the Unit Rates Report, separate unit rates have been calculated for:

- meters of size ≤25 m^3 per hour – the unit rate in this case is [redacted] per meter; and
- meters of size >25m^3– the unit rate in this case is [redacted] per meter.

The unit rates in both cases reflects the costs of:

- procuring new and refurbished meters;
- planning and scheduling the meters to be changed over and organising the resources (combination of direct and contractor) to carry out the meter change;
- installing the meters; and
- carrying out the testing required by AS 4944 and the Victorian Code.

Further detail on these unit rates can be found in the Unit Rates Report.

Tables 5.9 and 5.10 set out the forecast cost of the PMC program in the networks.

[46] AER, *Draft Decision: SP AusNet Access Arrangement 2013-17, Part 1*, September 2012, page 60.

Table 5.9: Victoria Network: Meter Replacement Cost Estimate ($2016, direct costs)

	2018	2019	2020	2021	2022	Total
Meters with Capacity ≤25m³ per hour						
Number of PMCs	[redacted]					144,956
Unit Rate ($/meter)			[redacted]			n.a.
Forecast Cost ($000)	[redacted]					$19,396
Meters with Capacity >25m³ per hour						
Number of PMCs	[redacted]					6,805
Unit Rate ($/meter)			[redacted]			n.a.
Forecast Cost ($000)	[redacted]					$11,683
Total Program						
Total All Meters ($000)	$7,156	$7,156	$7,156	$4,805	$4,805	$31,078

Note: Totals may not add due to rounding.

Table 5.10: Albury Network: Meter Replacement Cost Estimate ($2016, direct costs)

	2018	2019	2020	2021	2022	Total
Meters with Capacity ≤25m³ per hour						
Number of PMCs	[redacted]					7,665
Unit Rate ($/meter)			[redacted]			n.a.
Forecast Cost ($000)	[redacted]					$1,026
Meters with Capacity >25m³ per hour						
Number of PMCs	[redacted]					250
Unit Rate ($/meter)			[redacted]			n.a.
Forecast Cost ($000)	[redacted]					$429
Total Program						
Total All Meters ($000)	$341	$341	$341	$216	$216	$1,455

Note: Totals may not add due to rounding.

5.6. Consistency of Forecast with the National Gas Rules

Consistent with the requirements of rule 79(1)(a) of the NGR, AGN considers the forecast capex for this project to be:

- *Prudent* – The expenditure is necessary to maintain the accuracy of meters and the integrity of metering services, and is of a nature that a prudent service provider that is subject to the regulatory obligations set out in the Victorian Code, the NSW Regulation, the National Measurement Act and AS 4944, would incur. The decision to smooth the replacement program over the AA period also represents a prudent decision, given the additional costs and risks that would be faced if additional resources had to be mobilised and de-mobilised on a yearly basis.
- *Efficient* – The manner in which we intend to carry out the replacement program can also be considered efficient, because it will be carried out:
  - by meter testers, manufacturers and gas fitters that have all been selected through competitive tender processes; and
  - on a steady basis over the AA period, which will enable us to:
    - minimise the internal and external costs associated with delivering the program (e.g. because it will avoid the internal and external costs that may be incurred when rapidly mobilising and demobilising resources and will also allow the optimal number of refurbished meters to be used);
    - reduce the field risks to as low as reasonably practicable, because it will allow retention of, and investment in, trained contractors; and
    - minimse the non-compliance risks.
- *Consistent with accepted good industry practice* – Complying with the regulatory obligations set out in the Victorian Code, the NSW Regulation, the National Measurement Act and AS 4944 is consistent with accepted good industry practice.
- *Achieves the lowest sustainable cost of delivering pipeline services* – Carrying out the replacement program in a smoothed manner represents the most cost effective option and will contribute to the attainment of the lowest sustainable cost of delivering pipeline services over the next AA period.
- *Is consistent with feedback received from customers and stakeholders* – Customers consider the safe operation of our networks to be of highest importance.

The capex can therefore be viewed as being consistent with rule 79(1)(a) of the NGR.

The proposed capex is also consistent with rule 79(1)(b), because it is necessary to:

- *maintain the integrity of services (rule 79(2)(c)(ii))* – carrying out the testing and meter replacements proposed in this Plan will enable us to maintain the integrity of the metering services, which is, as noted above, critical to:
  - ensuring the accuracy of the measurement of our customers' gas usage falls within the prescribed tolerance band of +2% to -3%;
  - minimising the volume of unaccounted for gas at larger consuming sites; and
  - ensure customer bills accurately reflect their usage.
- *comply with a regulatory obligation (rule 79(2)(c)(iii))* – carrying out the testing and meter replacements proposed in this Plan will ensure that we comply with the regulatory obligations prescribed in:
  - the National Measurement Act 1960;
  - the Victorian Code;
  - the NSW Regulation; and

- AS 4944.

As noted above, if we fail to comply with the obligations set out in these instruments it can constitute a breach of our licence and authorisation, result in penalties and a range of other compliance related actions.