Metering

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Approval and Amendment Record

VERSION	AMENDMENT OVERVIEW
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1. Purpose of this document

This document explains and justifies our capital expenditure (capex) on meter purchases for the replacement of our existing metering fleet for the forthcoming access arrangement period (1 January 2018 to 31 December 2022). It also sets out the costs of our digital metering pilot study. This document references other supporting document for further detail. The capex in this document excludes new meter purchases for the connection of new customers to the network. This cost is accounted for in our build-up of new connection costs. Refer to the Capital Expenditure Overview – Connections document.

The actual 2013 to 2015 capex detailed in this document does not include overheads, as this was reported separately to the AER in our Annual Regulatory Information Notices for these years, rather than being incorporated into each capex sub-category.

We have provided a separate document entitled "Digital Gas Metering Pilot Study – Overview Document" that provides further detail about the proposed digital metering capex that is included in metering capex forecasts in this Metering Overview Document.

Unless otherwise stated, capex is presented in real 2017 dollars and is expressed in total cost terms (i.e. direct costs plus escalations and overheads). Total values shown in tables and referred to in the text of this document may not reconcile due to rounding.

For clarity, Attachment 1 details how we have allocated the components of our asset costs between our different capex categories. We note that our Meter capex forecast relates to our meters asset category only.

We have provided our Meter Strategy documents to the AER with this Overview Document. The forecasts in these documents do not include labour escalators or overheads, whereas the forecasts in this Overview Document are total costs (unless otherwise stated). The following table reconciles the forecasts in the Meter Strategy documents with those in this Overview Document and our Access Arrangement Information.

Table 1: Breakdown of 2018-22 Network capex forecasts by direct costs, overheads and escalations ($M, Real 2017)

Program	Strategy	2018	2019	2020	2021	2022	Total
Time Expired Replacement - Small Meters	MG-SP-0007	2.4	0.1	1.4	0.5	0.4	4.7
Field Life Testing Program - Small Meters	MG-SP-0007	0.0	0.1	0.0	0.1	0.1	0.2
Small Meter Faults / Reactive Replacement	MG-SP-0007	0.1	0.1	0.1	0.1	0.1	0.5
Hand Held Meter Reading Devices	MG-SP-0007	0.1	0.1	0.1	0.1	0.1	0.4
Digital Metering Program - Incremental network costs only	MG-SP-0007	0.6	0.6	0.6	0.2	-	2.1
Time Expired Meter Replacement - Large Meters	MG-SP-0008	0.2	0.2	0.3	0.1	0.2	1.0
Field Life Testing Program - Large Meters	MG-SP-0008	0.0	0.0	0.0	0.0	0.0	0.2
Large Meter Faules / Reactive Replacement	MG-SP-0008	0.1	0.1	0.1	0.1	0.1	0.4
Daily Metering - Flow Correctors	MG-SP-0008	0.1	0.1	0.1	0.1	0.1	0.5

Program	Strategy	2018	2019	2020	2021	2022	Total
Total Direct (excluding escalations)		3.6	1.4	2.7	1.3	1.0	9.9
Overheads		0.2	0.1	0.2	0.1	0.1	0.6
Total including overheads (excluding escalations)		3.8	1.4	2.8	1.3	1.1	10.5
Escalations		0.0	0.0	0.0	0.0	0.0	0.1
Total including overheads and escalations		3.9	1.5	2.8	1.3	1.1	10.6

2. Structure of this document

This document is structured as follows:

- Section 3 details our meter capex profile for the previous, current and forthcoming access arrangement periods.
- Section 4 explains the nature of meter capex.
- Section 5 explains and justifies our actual meter capex against the Australian Energy Regulator's (AER) allowance in the current period. It also provides an overview of the outcomes that it has delivered.
- Section 6 explains our forecasting methodology for meter capex for the forthcoming period.
- Section 7 sets out our meter capex forecast for the forthcoming access arrangement period, which includes the incremental costs of our proposed digital meter pilot.
- Section 8 explains why our meter capex forecast meets the new capex criteria in Rule 79.
- Section 9 details the supporting documentation relevant to our meter capex forecast.

3. Expenditure profile

The tables below present our actual and forecast meter capex for the previous, current and forthcoming access arrangement periods. Please note that totals may not reconcile exactly due to rounding.

Table 2: Actual metering capex for 2008-12 ($M, Real 2017)

	2008	2009	2010	2011	2012	TOTAL
AER Final Decision	2.8	2.3	2.2	2.3	2.3	11.9
Actual	2.0	2.2	2.7	2.0	1.9	10.8
Variance (Actual minus Final Decision)	(0.8)	(0.1)	0.6	(0.3)	(0.4)	(1.1)

Table 3: Actual metering capex for 2013-17 ($M, Real 2017)

	2013	2014	2015	2016	2017	TOTAL
AER Final Decision	3.7	2.7	2.6	2.0	2.3	13.4
Actual / Estimated	2.3	3.0	2.0	1.4	0.9	9.5
Variance (Actual minus Final Decision)	(1.4)	0.2	(0.6)	(0.6)	(1.4)	(3.9)

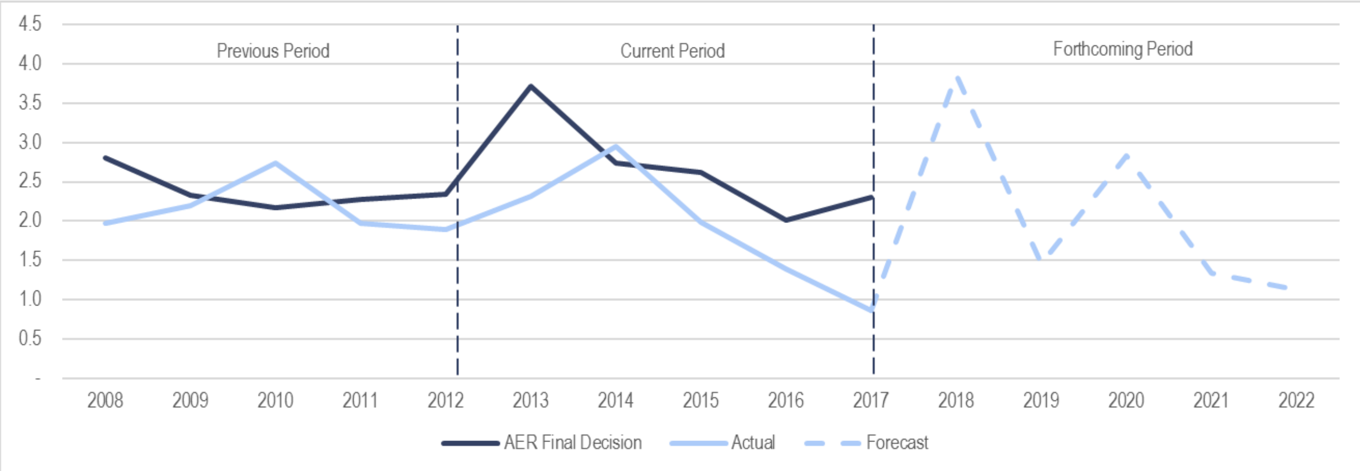
Table 4: Forecast metering capex for 2018-22 ($M, Real 2017)

	2018	2019	2020	2021	2022	TOTAL
Meter replacement	3.2	0.8	2.2	1.1	1.1	**8.5**
Digital Meter Pilot	0.6	0.6	0.6	0.2	-	**2.1**
Forecast for the 2018-22 access arrangement period	3.9	1.5	2.8	1.3	1.1	**10.6**

The cost of the digital meter pilot represents the incremental cost of installing digital meters, rather than standard meters. This is discussed further in our Digital Meter Overview Document.

The information in the above tables is shown in graphical form in Figure 1 below. The forecast capex is for meter replacements and the costs of the digital meter pilot, whereas historical data includes meter replacement and meter purchases for new connections. For the forthcoming access arrangement period, meter purchases associated with new connections are included in our capex forecasts for residential connections and commercial and industrial connections.

Figure 1: Previous, current and forecast meter capex ($M, Real 2017)



An overview of our metering capex for the current access arrangement period, and our performance against the AER allowance was provided in our 2012 access arrangement proposal. We have not considered these matters in any further detail in this document.

For the current access arrangement period, our expected total actual expenditure of $9.5 million will be $3.9 million (29 per cent) lower than the AER allowance. This difference principally reflects small variations between the forecast and actual volumes of meters replaced, noting that actual replacements are determined by the results of testing undertaken during the period.

For the 2018 to 2022 period, we are forecasting a total of $10.6 million for meter replacement capex and the digital meter pilot. For the reasons set out in this overview document, the forecast capex is efficient and accords with the confirming capex criteria in the National Gas Rules. Our forecast expenditure is driven primarily by the meter volumes that will need to be replaced over the forthcoming access arrangement period in accordance with our compliance obligations.

Further details of our expenditure forecasting method are provided in section 6, while section 7 sets out our forecasts.

4. Nature of expenditure

4.1. Definition of meter capex category

This capex category captures the cost of meter procurement, which includes:

- Procuring meters to replace existing meters due to regulatory requirements;
- Procuring meters to replace existing meters when they fail to read data accurately;
- Procuring data capture equipment, such as data loggers, flow computers and Portable Data Entry units when these devices are no longer serviceable or are required to serve new customers; and
- The incremental network costs to implement the digital meter pilot.

Our meter capex does not include new meter purchases for the connection of new customers to the network. This cost is accounted for in our build-up of new connection costs. Refer to the Capex Overview – Connections document.

Capex associated with installing meters are excluded from this meter capex category. Please refer to Attachment 1 of this overview paper for further information on the cost allocation between capex categories.

Gas meters are currently exempt from the relevant requirements of the *National Measurement Act 1960 (Cth)*. This exemption is expected to be lifted during the forthcoming access arrangement period. Lifting this exemption will require gas meter manufacturers to obtain pattern approval and verification of gas meters to ensure that each meter type is fit-for-trade, and functions as designed within the maximum permissible error over a range of operating conditions.

The National Measurement Institute has engaged a Gas Metering Advisory Committee to review, adapt and implement the International Standard OIML R137 Gas Meters and OIML R140 Measuring Systems for Gaseous Fuels. The adoption of these standards may require us to change our processes and IT systems to accommodate the new requirements. The cost of future changes (if any) has not been included in our capex forecasts.

4.2. Digital meter trial

We are undertaking an initiative to trial a new set of ultrasonic gas meters. The ultrasonic gas meter has been developed and certified by EDMI against the international standard R137-142:2012 (OIML). The model is the Helios G6000, which has several features which benefit both the network and the end use customer, including:

- Ability to utilise remote communications via United Energy's AMI platform;
- Remote shutoff; and
- Remote reads for retailer transfer.

Stage 1 of our investigation involves working with Silver Springs Networks to integrate 100 of the ultrasonic gas meters with United Energy's AMI communications network. Stage 1 will be completed shortly. SilverSprings is currently integrating five trial units, and only after a successful test bench demonstration will we agree to integrate the remaining 95 units and install them as market ready meters in the field.

Stage 2 is a full pilot study involving the installation of 10,000 functional ultrasonic remotely read gas meters which will communicate with United Energy's AMI network. The purpose of Stage 2 is to determine the costs and benefits of the rollout of digital gas meters across our residential and small commercial customer base. The incremental costs of the pilot, excluding the IT component, are included in the metering capex presented in this submission. The costs associated with making the necessary changes to ICT systems are captured in our ICT expenditure forecast.

Our "Digital Gas Metering Pilot Study – Overview Document" provides further detail about the proposed digital metering capex.

4.3. Regulatory obligations or requirements

Under Rule 79, capex is justifiable if, among other things, the capex is necessary:

- To maintain and improve the safety of services; or
- To maintain the integrity of services; or
- To comply with a regulatory obligation or requirement; or
- To maintain the service provider's capacity to meet levels of demand for services existing at the time the capex is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity).

The assets procured through our meter capex are critical to ensuring the safe and accurate operation of our metering assets in accordance with the key regulatory obligations outlined in the table below.

Table 5: Key regulatory obligations

Regulatory instrument	Summary of obligations
Victorian Gas Distribution System Code	The Code sets out the minimum standards for the operation and use of the distribution system. Section 7.2.3 of the Code sets out requirements relating to testing of meter families. Amongst other things, this section requires us to comply with Australian Standard AS/NZS 4944:2006 "Gas meters - In service compliance testing".
Gas Safety Act 1998	The *Gas Safety Act 1997* (the Act) provides for the safe conveyance, sale, supply, measurement, control and use of gas and to generally regulate gas safety. Under section 32 of the Act, we must manage and operate our facilities to minimise as far as practicable: (a) the hazards and risks to the safety of the public and customers arising from gas; and (b) the hazards and risks of damage to property of the public and customers arising from gas; and (c) the hazards and risks to the safety of the public and customers arising from: (i) interruptions to the conveyance or supply of gas; and (ii) the reinstatement of an interrupted gas supply. Division 2 of Part 3 of the Act sets out provisions relating to the preparation of, and compliance with, safety cases for gas facilities. Under these provisions, we must submit a safety case to Energy Safe Victoria (ESV) for each of our facilities. We must comply with a safety case that has been accepted by ESV.
Gas Safety (Safety Case) Regulations 1999	These Regulations detail requirements relating to, amongst other things, the purpose and content of safety cases. The Regulations require us to specify the safety management system being followed to ensure compliance with its obligations under section 32 of the Act (i.e. to ensure the safe and reliable supply of gas). Regulation 17 states that the safety management system for a facility must specify the means used or to be used by the gas company to ensure that the design, construction, installation, operation and maintenance of the facility and any modification of the facility: (a) are adequate for the safety and safe operation of the facility; and (b) provide adequate means of achieving isolation of the facility or any part of the facility and pressure control in the event of an emergency; and (c) provide adequate means of gaining access for servicing and maintenance of the facility and machinery and other equipment; and (d) provide adequate means of maintaining the structure and operation of the facility; and (e) take into account the results of the formal safety assessment for the facility.

Our metering capex is focused on ensuring that we undertake our network functions in accordance with these regulatory obligations at an efficient cost, to achieve the lowest sustainable cost of providing services.

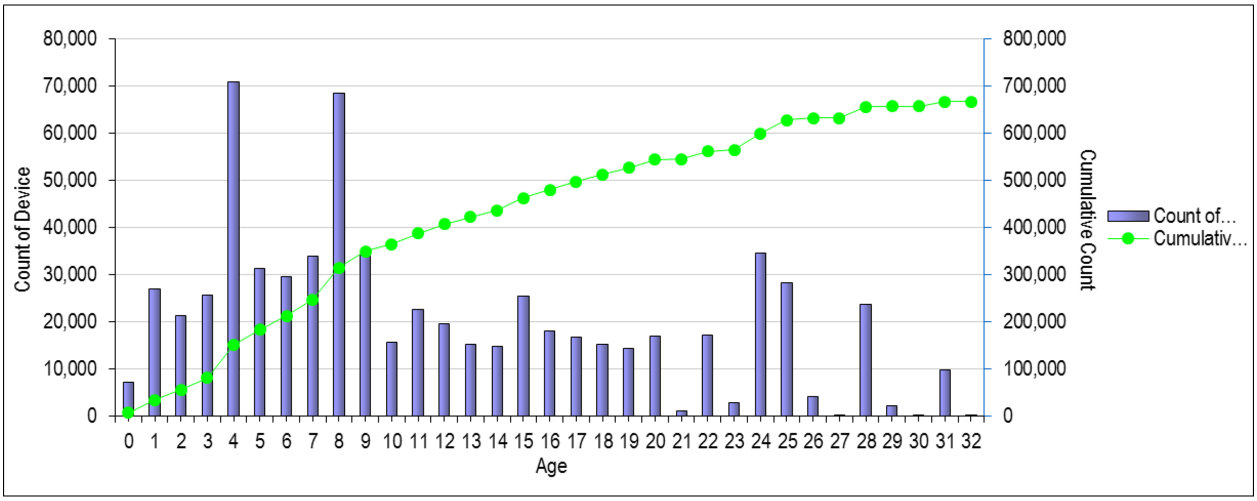
4.4. Asset age profile

As explained below, asset age drives the timing of our inspections that must be undertaken to ensure that we comply with our regulatory obligations.

4.4.1. Small meters

Small consumer meters[1] make up 96 per cent of the meters installed on our network. The age profile of the small meter population is shown in Figure 2 below. The figure shows the age of meter families since last installation with respect to population size. A meter family that was installed new 30 years ago and refurbished after 15 years would show on this chart as now being 15 years old.

Figure 2: Small consumer meter age profile (from install date)



The small consumer meter age at replacement generally ranges between 15 years and 31 years in the field. It is noted that:

- 30 percent of the total population of small consumer meters is between 15 and 31 years old. These meters are a mixture of mainly aluminium and tin case construction.
- 70 percent of the total population is aged between 0 and 15 years.
- The average age of the small meter network is nine years.

4.4.2. Large meters

Approximately 27,000 meters installed on our network have a capacity greater than 10 m^3/hour and are used for large consumer applications, as well as non-standard small meter applications greater than 6 m^3/hour. Almost all (98.7 per cent) of these large consumer meters are of the robust diaphragm construction with an expected service life of up to 40 years.

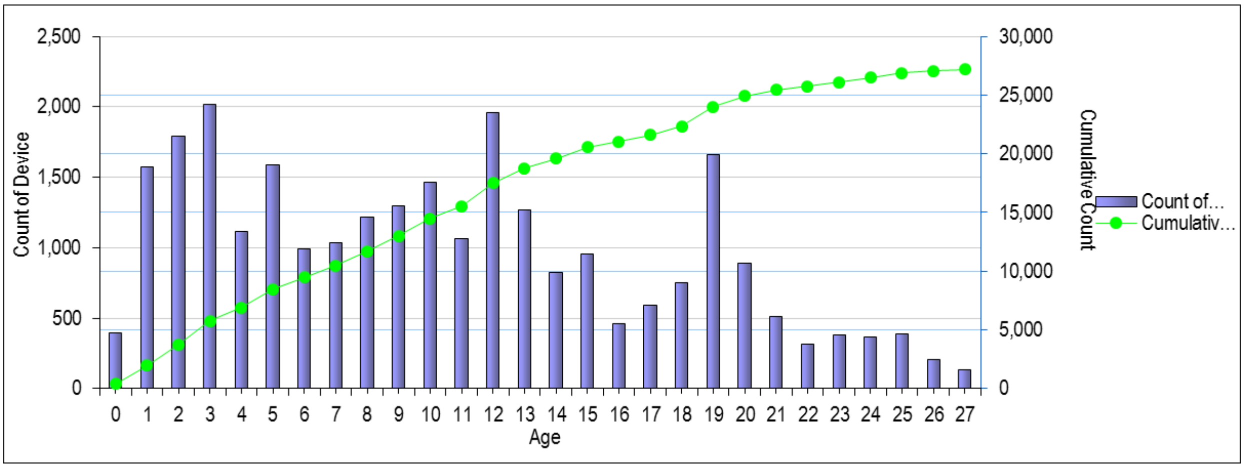
The remaining active large consumer meters include approximately 290 positive displacement rotary meters and 78 larger capacity turbine meters.

We have approximately 314 interval meter sites capable of recording hourly consumption data. 125 of these sites have flow computers correcting gas flow for temperature and /or pressure. This equipment requires maintenance every six months. Parts are replaced and calibrated as required.

The age profile of large consumer meters is shown in Figure 3.

[1] With a maximum capacity of 10 m^3 of flow per hour.

Figure 3: Large consumer meter age profile



4.5. Key drivers of meter capex

Our metering capex is driven by the six factors outlined in the table below.

Table 6: Meter capex drivers

Expenditure Driver	Description
1. Replacement driven by compliance with the Gas Distribution System Code and Australian Standards	Meter replacement is an ongoing activity, which is necessary to ensure that gas meters in the field are replaced when they fail to read data accurately. A proportion of such meters is repaired, which is an operating expense. However, meters that cannot be repaired and returned to service must be replaced. <u>Small consumer meters</u> There are approximately 667,000 small consumer meters installed on our network. We must sample test each small meter family (that is, a particular year and model type) at the end of its initial 15-year life, in accordance with Australian Standard AS/NZS 4944:2006. Depending on the results of sample testing: • The meter family may be assessed as having some on-going life, in which case it is scheduled for re-testing in 1, 3 or 5 years, depending on the most recent test results; or • The meter family may be assessed as failing, in which case the family is replaced in the following year. Criteria for meter accuracy and re-testing are set out in AS/NZS 4944:2006. <u>Large consumer meters</u> Approximately 27,000 of the meters installed on our network are large consumer meters. Other than the AL425 and AL1000 families (discussed below), the number of large consumer meters installed at present is small, so sample testing is not undertaken. Large meters are repaired at regular intervals of 10 of 15 years depending on the capacity of the meter. Specifically, meters with a capacity greater than 100m^3 per hour are removed and repaired at 10 years, while meters less than this capacity are removed and repaired at 15 year intervals. As noted above, the AL425 and AL1000 families are large enough to warrant statistical sampling. These meters are tested in accordance with AS/NZS 4944:2006. From 2019, other meter families such as the AL800 will have sufficient annual populations to support sample testing. We will begin testing these new meter families from 2019 onwards.
2. Defective or faulty meters	Separately from the testing program described above, faulty or defective meters are identified from time to time and must be replaced.
3. Data loggers and flow computers	These devices are used for large customers who require interval metering. The capex forecast provides for the replacement of existing devices that are no longer serviceable, and for the procurement of devices to service new customers.
4. Portable Data Entry units	These are hand-held devices are used by meter readers in the field to record meter readings of Tariff V customers. The capex forecast includes an allowance for the periodic replacement of these devices.
5. Digital meter pilot	Digital meters are expected to provide net benefits compared to the current manually-read mechanical meters within the next five-year period, by leverage United Energy's AMI communications. To test this view, this trial will gather detailed evidence to determine the costs and benefits of a company-wide rollout of digital meters. Our consumer engagement program indicates support for the trial. Further detailed information is provided in the digital metering overview paper, which accompanies this AAI.

5. Current access arrangement period expenditure

5.1. Explanation of current period expenditure

The table below details the variance between our actual metering capex and the AER's allowance for the current access arrangement period.

Table 7: Current access arrangement period annual meter capex and AER allowance ($M Real 2017)

	2013	2014	2015	2016	2017	TOTAL
AER Final Decision	3.7	2.7	2.6	2.0	2.3	13.4
Actual / Estimated	2.3	3.0	2.0	1.4	0.9	9.5
Variance (Actual minus Final Decision)	(1.4)	0.2	(0.6)	(0.6)	(1.4)	(3.9)

Table 7 shows that our actual meter capex for the current access arrangement period will be $3.9 million or 29 per cent below the AER's allowance. The capex allowance is based on forecasts of the meter families that are expected to fail testing, and therefore require replacement. As already noted, the meter volumes that are actually replaced is determined by the test results. We did not prematurely replace any meter family in the period that passed field life extension (FLE) testing or being within its compliance period.

Over the current access arrangement period, 15 meter families were forecast to be removed, however, six of the forecast 15 meter families continued to pass sample testing. At the same time, three additional families which were not included in the forecast of meter replacements failed the sample testing in the current access arrangement period. The net effect was that fewer meters were removed during the access arrangement period than forecast, resulting in lower overall meter capex compared to the allowance.

On average 28,000 small consumer meters were replaced annually over the last two access arrangement periods. However, this average masks significant annual variations. For example, in 2012, 70,000 meters were replaced while in 2016, 13,000 meters were replaced. This variation between years is typical and is the result of variation in meter type and population size at failure.

5.2. Efficiency of expenditure

We have no discretion regarding meter replacement decisions so the volume of meter replacements we have completed is efficient. This is because replacements are driven by the testing regime and criteria specified in Australian Standard AS/NZS 4944:2006.

Our sampling plans in the current access arrangement period were prepared in accordance with the requirements of AS/NZS 4944, and have been approved by the AER, pursuant to sections 7.2.3(a)(ii) and (iv) of the Gas Distribution System Code. The meter volumes procured and replaced in the current access arrangement period reflect the outcomes of the approved sampling process.

In terms of unit rates, we have competitively-tendered contracts in place to ensure that all new meters are procured at market prices.

As noted in section 4.3, capex is justifiable under Rule 79 if the expenditure is necessary to comply with a regulatory obligation or requirement. The information presented in this document demonstrates that:

- We undertake our metering capex efficiently, and in accordance with all applicable standards and regulatory obligations; and
- Accordingly, our actual metering capex in the current period conforms with the new capex criteria set out in Rule 79.

5.3. Benefits of expenditure to customers

Metering capex enables us to provide accurate and safe meters to all customers, in accordance with the requirements of section 7.2.3 of the Victorian Gas Distribution System Code and Australian Standard AS/NZS 4944:2006 “Gas meters - In service compliance testing”.

Our metering capex provides benefits to customers by enabling us to undertake our metering functions in accordance with our regulatory obligations at an efficient cost, to achieve the lowest sustainable cost of providing services.

6. Expenditure forecasting method

6.1. Overview of approach

Our forecasting method focuses on the six expenditure drivers described in section 4.5, to forecast annual meter capex for the forthcoming access arrangement period, as summarised in Table 8.

Table 8: Expenditure forecasting method

Expenditure Driver	Approach to forecasting
1. Replacement riven by compliance with the Gas Distribution System Code and Australian Standards	As noted above, a family of meters can only be retained in service after its initial life if the sample-tested meters pass the acceptance criteria set out in AS/NZS 4944:2006. Under that standard: • The number of years that the meter family can be retained in service after its initial life is dependent on the sample meter test results; and • Subsequent periodic sample testing of the family is undertaken until the acceptance criteria are not met, in which case the entire meter family is removed from service in the following year. A key input into our forecast of meter replacement capex is, therefore, a forecast of the meter families that are expected to fail sample testing, and the year in which failure is expected to occur. Our approach to developing forecasts of meters up to and including a capacity of $30m^3$ per hour to be removed from service was to extrapolate FLE testing results on a five, three or one year extension period to determine the potential year of failure. The extension period commences from the last sample testing result, or where no sample testing has been done the extension commences at: • Five years for all AL series meters (e.g. Al425, Al800 and AL1000). • Five years for EML750 meters. • Five years for RKMR08 meters. • Three years for EML602 meters (e.g. EML602, EML602R and EML602RR). • One year for EML610 meters (e.g. EML610 and EML610R). Commencement years are based on average FLE test results following the initial in-service compliance period (15 years). For meter families with limited history, extrapolation commences at five years. Our forecast of meter replacement capex recognises that some meters removed from service can be repaired and returned to service. The expenditure forecast therefore reflects the net number of new meters required after allowing for the repair of some failed meters. Replacement of meters greater than $30m^3$ (other than the AL425 and AL1000 families) is assumed to be undertaken at set periods of 10 or 15 years from the last test year. Meters with a capacity of $100m^3$ per hour or greater are replaced at 10 years while meters with a capacity greater than 30 m^3 per hour and less than $100m^3$ per hour are replaced at 15 years. As noted above, meter families AL425 and AL1000 are subject to statistical sampling, so our replacement forecasts for these families reflects the projected results of testing in accordance with AS/NZS 4944:2006.
2. Defective or faulty meters	Occasionally, individual meters may fail due to mistreatment, corrosion, failure of parts or accidental damage. The forecast of individual meter failures is based on trend analysis of historical records.
3. Data loggers and flow computers	The number and cost of data loggers and flow computers required to meet growth and replacement of existing units is based on current costs escalated to 2017 prices, and trend analysis of historical records.
4. Portable Data Entry units	Approximately 60 hand-held meter reading devices are used in the field. We estimate that 10 of these devices require replacement each year due to their high use and exposure to the elements.

5. Digital meters	The capex allowance includes the forecast incremental costs of purchasing 10,000 digital meters to conduct the trial. The cost of the digital meter pilot is based on information from meter providers, and bottom up estimates of the costs of managing the pilot and making the necessary modifications to our IT systems. The rationale for the trial is set out in the digital metering overview paper, which is provided as part of this AAI.

The steps adopted to derive our forecast of metering capex are summarised below:

Field Life Extension:

- Establish small meter families currently being sample tested.
- Determine future families to be sample tested based on initial life of meter.
- Determine the number of sample test meters required by year over the forthcoming period.
- Extrapolate failure of future families by applying five, three and one year failure assumptions.
- Determine which meter families are repairable by year.
- Determine repair rate of repairable meters.
- Forecast volume of new meters required by meter type.
- Determine the cost of new meters by meter type.
- Estimate new purchase cost of meters in real 2017 dollars.

Time Expired Replacement:

- Summarise the number of meters being removed by year over the forthcoming period due to FLE testing.
- Determine the number of large meters requiring replacement over the forthcoming period by year based on the applicable 10 or 15 year initial life
- Determine which meter families are repairable by year
- Determine repair rate of repairable meters
- Forecast volume of new meters required by meter type
- Determine the cost of new meters by meter type
- Estimate new purchase cost of new meters in real 2017 dollars over the forthcoming period by year

Defective or Faulty Meters:

- Determine the historic failure rate of small and large meters as a percentage of the installed meter population.
- Forecast the growth in metering population for small and large meter types for the forthcoming period by year.
- Forecast the volume of small and large defective meters for the forthcoming period by year based on the trend analysis of historic records.
- Determine the repair rate of defective meters
- Forecast volume of new small and large meters required.
- Determine the weighted average cost of small and large meter types in real 2017 dollars.
- Estimate new purchase cost of meters in real 2017 dollars.

Data loggers and flow computers:

- Forecast the volume of data loggers required to meet growth and replacement of existing units based on trend analysis of historic records.
- Determine the cost of data logger installation escalated to 2017 dollars.

- Estimate new data logger and flow computer costs in real 2017 dollars over the forthcoming period by year.

Portable Data Entry units:

- Forecast the volume of units requiring replacement over the forthcoming period by year.
- Determine the cost of a replacement unit escalated to 2017 dollars.
- Estimate new Portable Entry Units costs in real 2017 dollars over the forthcoming period by year.

Digital Meter Trial

- "Digital Gas Metering Pilot Study – Overview Document".

6.2. Key assumptions

The key assumptions underpinning our metering capex forecast are as follows:

- Meter costs of small and large meters will not change significantly before or during the forthcoming period.
- Meters will continue to be repaired during the forthcoming period. Specifically:
  - 90 per cent of potentially repairable meters are able to be repaired (so 10% of meters initially identified as repairable will need to be purchased as new).
  - 70 per cent of potentially repairable RK1000 gas meters are able to be repaired.
  - 50 per cent of defective meters are repairable.
- The current AER approved procedures for sample testing remain in place for the duration of the forthcoming period.
- Forecast unit costs for the forthcoming period assume no material changes in the structure of the gas meter market. In this regard, we note that:
  - The small size of the Australian gas industry limits the number of available domestic gas meter suppliers. We predominantly use two major suppliers;
  - The availability of more than one supplier provides competitive pricing and spreads the risk of any supply issues; and
  - The withdrawal of one of the major suppliers from the Australian market represents a moderate risk for us, and may cause an increase in the unit cost of new and repaired meters, and may also raise meter availability issues across the industry.
- Currently, there is only one repairer of domestic meters in Victoria. Our forecasts of meter purchase volumes assume that this repairer will continue to operate. The withdrawal of this repairer may require us to cease repairing failed meters for some period, and to increase the purchase new meters to replace the domestic meters that have failed testing. As shown in section 6.3 below, this may result in a material increase in new meter purchase volumes.

6.3. Forecast meter volumes

The tables below summarises our meter purchase volumes relating to small and large Tariff V meters

6.3.1. Field Life Extension Program

A family of meters can only be retained in service after its initial life if the sample-tested meters pass the acceptance criteria set out in AS/NZS 4944:2006. Diaphragm meters up to and including a capacity of 30 m^3 per hour qualify for sample testing.

Our forecast of sample testing volumes is provided below. It assumes 50% of all meter families will be tested using "variables" which reduces the sample volume of meters to be removed from the field in comparison to testing by "attributes". Both are acceptable approaches as set out in AS/NZS 4944:2006.

Table 9: Forecast Meter purchase volumes – Field Life Extension

	2018	2019	2020	2021	2022
Field Life Extension meter Replacements	1,080	2,434	2,328	1,812	2,052
Repairable Meter Types (10 per cent to be replaced)	*852*	*1,958*	*1,975*	*1,317*	*1,439*
Non-repairable Meter Types (100 per cent to be replaced)	*228*	*476*	*353*	*495*	*613*
New Meter Purchases	**313**	**672**	**551**	**626**	**757**

6.3.2. Time-expired Meter Replacement

The time-expired program replacement meters at the end of their in-service compliance period.

A key input into our forecast of meter replacement volumes are the forecast results of sample testing for meters up to and including a capacity of 30 m^3 per hour. This feeds into the replacement programs for both small meters (100% of the program) and large meter (for Al425 to AL1000 meter families only). Replacement of meters greater than 30 m^3 is assumed to be undertaken at set periods of 10 or 15 years from the last test year. Meters with a capacity of 100 m^3 per hour or greater are replaced at 10 years while meters with a capacity greater than 30 m^3 per hour and less than 100 m^3 per hour are replaced at 15 years.

Table 10: Forecast Tariff V meter purchase volumes – Time Expired (capacity of up to 10m^3 per hour)

	2018	2019	2020	2021	2022
Time expired meter replacements	59,613	953	26,879	43,419	18,147
Repairable Meter Types (10% to be replaced)	37,084	0	13,153	41,749	15,033
Non repairable Meter Types (100% to be replaced)	22,529	953	13,726	1,670	3,114
New Meter Purchases	26,238	953	15,042	5,845	4,618

Table 11: Forecast Tariff V meter purchase volumes – Time Expired (capacity >10m³ per hour)

	2018	2019	2020	2021	2022
Time expired meter Replacements	909	1,085	1,003	462	1,260
Repairable Meter Types (10% to be replaced)	*815*	*995*	*906*	*459*	*1,123*
Repairable Meter Types (30% to be replaced)	*94*	*90*	*97*	*3*	*137*
Non repairable Meter Types (100% to be replaced)	*0*	*0*	*0*	*0*	*0*
New Meter Purchases	**111**	**127**	**121**	**47**	**155**

6.3.3. Defective Meters

Occasionally, individual meters may fail due to mistreatment, corrosion, failure of parts or accidental damage. The forecast of individual meter failures is based on trend analysis of historical records. On average 0.32 per cent of commissioned small meters and 0.36 per cent of all large meters commissioned fail in operation each year. 50 per cent of all defective meters are non-repairable.

Table 12: Forecast Tariff V meter purchase volumes – Defective Meters (capacity of up to 10m³ per hour)

	2018	2019	2020	2021	2022
Defective Meters (50% to be replaced)	2,189	2,200	2,212	2,223	2,234
New Meter Purchases	**1,095**	**1,100**	**1,106**	**1,112**	**1,117**

Table 13: Forecast Tariff V meter purchase volumes – Defective Meters (capacity > 10m³ per hour)

	2018	2019	2020	2021	2022
Defective Meters (50% to be replaced)	99	103	108	113	118
New Meter Purchases	**50**	**52**	**54**	**57**	**59**

6.3.4. Digital Metering Program

In addition to the meter volumes set out above, we propose to undertake a digital meter pilot study involving the installation of 10,000 digital meters. These meters will be installed in new sites, and therefore the pilot has no impact on the costs or volumes of replacement meters set out above. The forecast capex associated with the digital meter pilot includes the incremental costs of digital meters. It excludes the required ICT capex which is itemised in our ICT Capex Overview Document. The costs of installing standard meters for new connections are presented in the Connections Capex Overview Document.

7. Expenditure forecasts

Table 14 details our forecast metering capex for the forthcoming access arrangement period.

Table 14: Meter capex forecast ($M, Real 2017)

	2018	2019	2020	2021	2022	Total
Field Life Extension	0.1	0.1	0.1	0.1	0.1	**0.4**
Time Expired Meter Replacement	2.8	0.3	1.7	0.7	0.6	**6.1**
Defective Meters	0.2	0.2	0.2	0.2	0.2	**0.9**
Data loggers and flow computers	0.1	0.1	0.1	0.1	0.1	**0.5**
Portable Data Entry units	0.1	0.1	0.1	0.1	0.1	**0.4**
Digital meter pilot - incremental cost	0.7	0.7	0.7	0.2	-	**2.2**
Total metering capex	**3.9**	**1.5**	**2.8**	**1.3**	**1.1**	**10.6**

Table 14 shows that the forecast meter replacement capex for the forthcoming period is expected to be variable with a maximum expenditure of $3.9 million in 2018 and a minimum of $1.1 million in 2022. We note that the forecast reflects our view that certain families of meters will be sample tested unsuccessfully, and require replacement over the forthcoming regulatory period. On average, we will spend $2.1 million per year for the forthcoming period.

The forecast capex also includes a modest amount relating to the digital metering trial, which is supported by our customers. As already noted, further details of the costs of the digital meter trial are provided in the Digital Metering Overview, which is submitted as part of this this Access Arrangement Information.

Our forecast has been arrived at on a reasonable basis and represents the best forecast possible in the circumstances[2].

[2] In accordance with rule 74 of the National Gas Rules.

8. Meeting Rules requirements

This section explains and justifies our metering capex forecast against the new capex criteria set out in Rule 79. It therefore demonstrates that our metering capex forecast is conforming capex, which should be approved by the AER as part of its final decision for our forthcoming access arrangement period.

8.1. The new capex criteria

Rule 79 defines the new capital expenditure criteria as follows:

(1) Conforming capital expenditure is capital expenditure that conforms with the following criteria:

(a) the capital expenditure must 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 services;

(b) the capital expenditure must be justifiable on a ground stated in subrule (2).

(2) Capital expenditure is justifiable if:

(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).

(3) In deciding whether the overall economic value of capital expenditure is positive, consideration is to be given only to economic value directly accruing to the service provider, gas producers, users and end users.

(4) In determining the present value of expected incremental revenue:

(a) a tariff will be assumed for incremental services based on (or extrapolated from) prevailing reference tariffs or an estimate of the reference tariffs that would have been set for comparable services if those services had been reference services; and

(b) incremental revenue will be taken to be the gross revenue to be derived from the incremental services less incremental operating expenditure for the incremental services; and

(c) a discount rate is to be used equal to the rate of return implicit in the reference tariff.

(5) If capital expenditure made during an access arrangement period conforms, in part, with the criteria laid down in this rule, the capital expenditure is, to that extent, to be regarded as conforming capital expenditure.

(6) The AER's discretion under this rule is limited.

8.2. How the forecast meets the new capex criteria

The information presented in this overview document and its supporting documents demonstrates that our proposed metering capex is consistent with a prudent service provider, acting efficiently and in accordance with good industry practice to achieve the lowest sustainable cost of providing services, as required by Rule 79(1). In particular, the proposed capex is necessary to comply with the following provisions of the National Gas Rules:

- Rule 79(2)(a) – The forecast capex in relation to the digital meter trial is justified because the overall economic value of the proposed expenditure is positive. Further explanation is provided in the "Digital Gas Metering Pilot Study – Overview Document", which forms part of this Access Arrangement Information.
- Rule 79(2)(c)(ii) – The forecast capex is required to maintain the integrity of services by ensuring that the accuracy of meters is maintained in accordance with the standards set out in Australian Standard AS/NZS 4944:2006.
- Rule 79(2)(c)(iii) - The forecast capex is required to comply with section 7.2.3 of the Victorian Gas Distribution System Code, which sets out requirements relating to testing of meter families, including a requirement to comply with Australian Standard AS/NZS 4944:2006 "Gas meters - In service compliance testing".
- Rule 79(2)(c)(iv) – The forecast capex is required to maintain our capability to provide metering services to new customers seeking connection to the network.

Given the above, the metering capex forecast for the forthcoming access arrangement period is consistent with the National Gas Objective, in that it promotes efficient investment in natural gas services that is in the long-term interests of consumers in terms of price, quality, safety, reliability and security of supply of natural gas services.

9. Supporting documentation

The following documents support our metering capex forecast for the forthcoming access arrangement period.

- Small meter strategy – MG-SP-0007
- Large meter strategy – MG-SP-0008
- MG Sample testing of small meters (AER approved)
- Digital Gas Metering Pilot Study – Overview Document.

Glossary

Abbreviations	
AAI	*Access Arrangement Information*
Act	*Gas Safety Act 1997*
AMI	*Advanced Metering Infrastructure*
AER	Australian Energy Regulator
ESV	Energy Safe Victoria
FLE	Field Live Extension
ICT	Information Communication and Technology
M	Million
NGR	National Gas Rules

Attachment 1 – Allocation of Asset Costs between Capex Categories

Expenditure Category		Capital Allocations							
Expenditure Category		Transmission & Distribution Mains	Services	Cathodic Protection	Meters[3]	Supply Regulators / Valve Stations	SCADA	IT Systems	Other
Mains Replacement	Planned and reactive replacement of distribution mains	Yes: 1. LP to HP replacement 2. MP replacement 3. Early Generation High Density Polyethylene pipe replacement 4. Reactive mains replacement.	Yes: 1. Where of a suitable standard reconnecting service after mains replacement 2. Replacement as part of the mains replacement program 3. Unplanned services renewal (i.e.~$1m pa) – not related to proactive Mains Replacement programs	No	No	Yes, installation of new supply regulators and valves	No	No	No
Customer Connections	Residential and C&I Connections	Yes, installation or extension of mains related to a new connection	Yes, installation of new service	No	Yes, purchase of new meters and installation of meters for new connections (excluding as part of the digital meter trial). (Note – purchases of new meters were previously part of Meters Capex.)	No	No	No	No

[3] For the purposes of capital allocation Meters is inclusive of the consumer service regulator.

Expenditure Category		Capital Allocations							
		Transmission & Distribution Mains	Services	Cathodic Protection	Meters[3]	Supply Regulators / Valve Stations	SCADA	IT Systems	Other
Meters Replacement	Planned and unplanned replacement of existing metering fleet	No	No	No	Yes, purchase of new meters: 1. to replace a failed meter; 2. to seed the time-expired meter program; and 3. for digital meter trial	No	No	No	No
Augmentation	Project to increase the capacity of the network	Yes, demand related mains augmentation	No	No	No	Yes, demand related regulator augmentation	No	No	No
Information Technology	-	No	No	No	No	No	No	Yes, complete IT program	No
SCADA	-	No	No	No	Yes, for vortex flow meter installations associated with supply regulators	No	Yes, complete SCADA program	No	No
Other capex	Supply Regulators – Replacement	No	Fire valve program	No	No	Yes, 1. integrity related supply regulator upgrades 2. Network valve repayment	No	No	No

		Capital Allocations							
Expenditure Category		Transmission & Distribution Mains	Services	Cathodic Protection	Meters[3]	Supply Regulators / Valve Stations	SCADA	IT Systems	Other
	Network Valves	No	No	No	No	Yes, All network valve programs	No	No	No
	Recoverable works	Various, assets created depend on project							
	Corrosion Protection	No	No	Yes, complete CP program	No	No	No	No	No
	Services / Meters	No	No	No	No	No	No	No	No
	Gas Heaters	No	No	No	No	Yes, installation / replacement of heating installations	No	No	No
	Pigging Capex	Yes, Non-piggable pipeline alteration program	No	No	No	No	No	No	No