AusNet

Gas Network

Consumer Regulator Strategy

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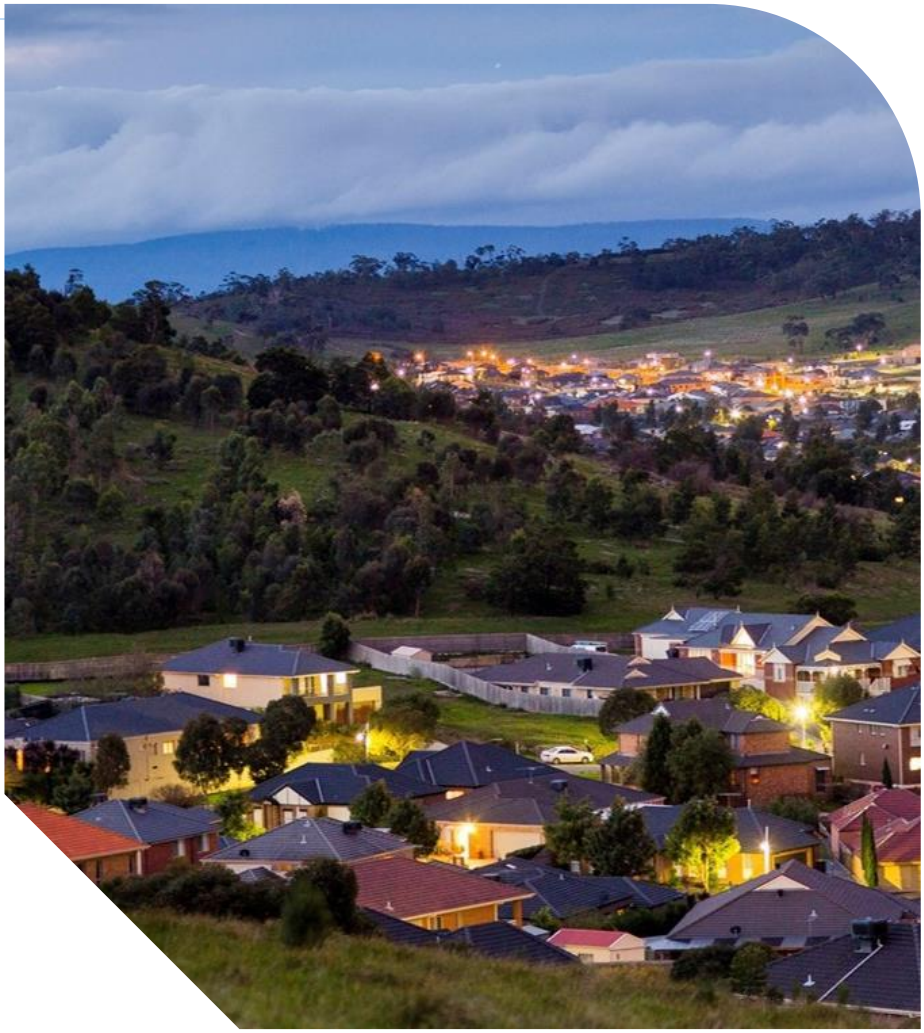

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AusNet Services
Level 31, 2 Southbank Boulevard
Melbourne Victoria 3006
Ph: (03) 9695 6000

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Executive Summary

This document outlines the strategy to maintain safe and reliable operations of Consumer Regulators assets for the 2024-28 access arrangement period.

A Consumer Regulator is defined as a regulator that reduces the gas pressure from network pressure to a pressure acceptable for entry into a domestic or Industrial & Commercial (I&C) customers' premise. Such pressure regulating units extend from the consumer's service isolation valve up to the fitting line entry point to the consumer's meter after the regulator. The scope of assets that fit this description includes domestic, I&C, Metering Room, and Black Box installations.

The strategy provides overview and analysis on asset performance, risks and investment required within the stated period to maintain safe and reliable operation.

Further to this AusNet Services has 7 key objectives with regards to managing Consumer Regulator assets:

- Maintain network safety in accordance with the Gas Safety Case;
- Maintain top quartile operating efficiency;
- Undertake prudent and sustainable network investment; and
- Delivery of valued services to our customers.
- Simplify and remove cost by investing in technology and automation;
- Provide sector leading customer experience by improving systems, processes and communication;
- Secure future for gas with increased utilisation and renewable gas options.

Error! Reference source not found. below provides overview on CAPEX requirement associated with this asset class for the 2024-28 regulatory period.

Table 1: Planned Consumer Regulators Capex Summary ($2022, $'000)

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
			[C.I.C]				

Regular maintenance cycles of 6-monthly Operational checks and 6- or 10-yearly Full Maintenance Overhaul on large I&C metering sites will be maintained in the strategy period to ensure they are operating safely and reliably. The remainder of metering sites are maintained under fault response, with response times being monitored as part of the KPI framework.

The combined OPEX and CAPEX programs that make up this strategy contribute to the safe management of AusNet Services' metering assets.

1. Document Overview

1.1. Purpose

The Consumer Regulators Strategy is one of several plant strategies developed and maintained for the management of AusNet Services' Gas Distribution Network. This document provides background on Consumer Regulators and describes the approach used to manage the assets.

1.2. Scope

Consumer regulator stations are facilities that provide natural gas at a reduced pressure directly to the consumer. This strategy covers the regulators used to maintain pressure at residential, industrial and commercial customer sites. It does not cover City Gate, Field Regulator and District Regulator facilities that supply gas to distribution networks as these are covered in AMS 30-51 Network Regulator Strategy.

1.3. Definitions

- **Commercial Meters** are larger metering installations (> 10m^3/hr) operating at pressures less than 4kPa.
- **Domestic Meters** or residential meters are small capacity meters (< 10m^3/hr) operating at pressure less than 4kPa and typically located at the front of domestic properties.
- **Energy Safe Victoria (ESV)** is a government body responsible for the safety and technical regulation of AusNet Services' energy networks, including the gas distribution network.
- **Gas Meter** is mechanical device (usually) used to measure the volumetric flow rate of gas that passes the device. The volume of energy that passes through the meter is dependent on both gas pressure and temperature when the volume is measured.
- **I&C** Industrial and Commercial
- **Industrial Meters** are large capacity metering installations (> 10m^3/hr) operating at pressures greater than 4kPa. Industrial meters can only be maintained by System Operations trained personal.
- **Installation type** refers to the classification of domestic, commercial or industrial meters.
- The **Gas Distribution System Code (GDSC)** underpins specific regulatory requirements for gas distribution networks.
- **SAP** is the asset management IT system that stores asset records, project work flow and notifications.

1.4. Asset Management Framework

Figure 1 below provides an overview of AusNet Services asset management framework. This framework is centred around the objective to operate the network in top quartile of efficiency benchmarks with an aim to care for customers and strive to make energy more affordable.

The Gas asset management strategy plays a key role in ensuring alignment between asset management objectives, corporate objectives, and stakeholder requirement. This document is one of the strategies providing visibility on network performance, issues, risks, and investment required to support delivery of safe and reliable service and achieve the long-term objectives of the gas distribution network.

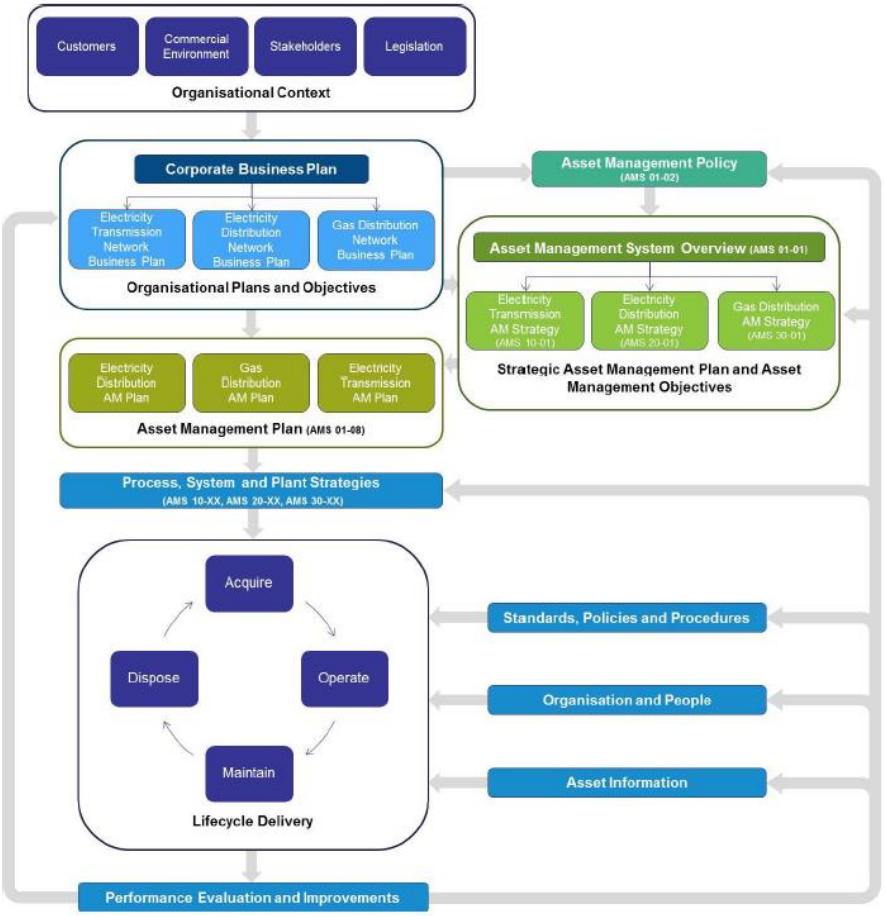

Figure 1: Ausnet Services Asset Management Framework

1.5. References

The following regulations and requirements are applicable to and influenced the design, operation and maintenance of Consumer Regulators:

- Gas Safety Act 1997
- Gas Distribution System Code (Version 14)
- Gas Safety Case (Safety Case) Regulations 2018
- TS4356 Metering Room

2. Alignment with Drivers

AusNet Services' purpose statement is "Connecting communities with energy and to accelerate a sustainable future". This statement places the customer (as individuals and communities) at the forefront as a business driver and acknowledges the critical relationship with their energy supply and usage. The following diagrams shows that Customers are a key theme linking the Corporate Business Strategy with the Gas Network Vision and Gas Network Objectives, which influence the key plant strategies forming the basis of the regulatory submission.

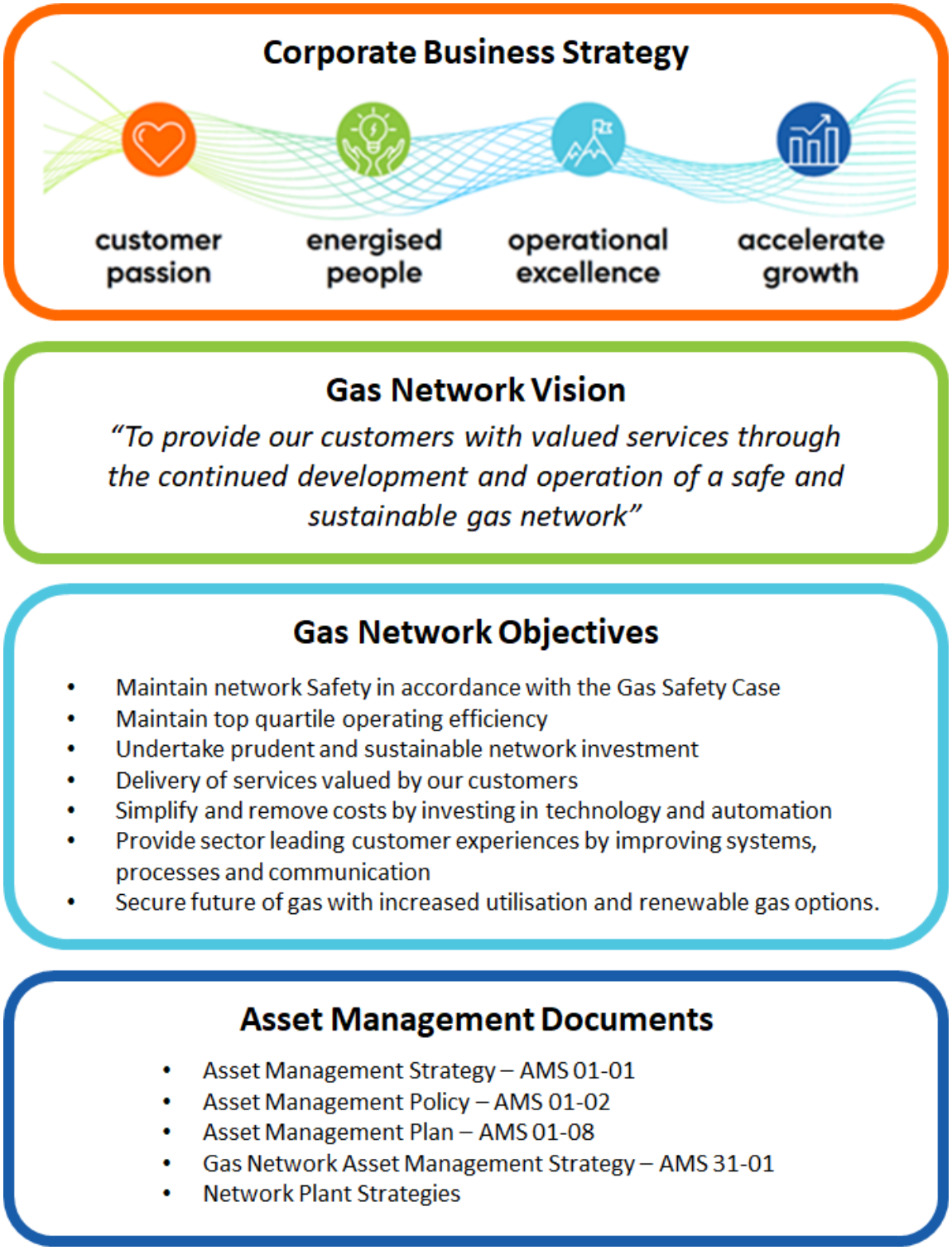

Figure 2: The Business Strategy, Network Vision and Objectives all centre around our customers

The Gas Network Objectives align with the four Corporate Business Objectives as shown below:

Maintain network Safety in accordance with the Gas Safety Case.

Maintaining network safety supports our commitment to "Mission Zero", ensuring our people go home safety at the end of the day. This is one of the strategic priorities of the "energised people" corporate objective.

Maintain top quartile operating efficiency.

AusNet Services aspires to operate all three of its core networks in the top quartile of efficiency benchmarks. This aligns with the "operational excellence" corporate objective.

Undertake prudent and sustainable network investment.

This network objective supports AusNet Services' obligation to undertake prudent and sustainable network investment, as defined in the National Gas Rules and Gas Distribution System Code. This in turn aligns with the "operational excellence" corporate objective.

Delivery of valued services to our customers.

AusNet Services strives to better understand our customers (their needs and behaviours) in order to deliver the services they value. This aligns with the "customer passion" corporate objective.

Simplify and remove costs by investing in technology and automation.

By working more efficiently, AusNet Services improves its "operational excellence" and provides better value for customers.

Provide sector leading customer experiences by improving systems, process and communication.

Similarly, improving how we work increases efficiency, thereby improving "operational excellence".

Secure future of gas with increased utilisation and renewable gas options.

Exploration of renewable gas options and the role gas will play in the energy ecosystem of the future will support the "accelerate growth" corporate objective.

3. Asset Overview

3.1. Introduction

Each customer supply point across the distribution network features a regulator that reduces the gas to a usable pressure as per the customer demand. AusNet Services has approximately 763,400[1] connection points (744,500 domestic & 18,900 I&C), each with a dedicated regulating facility.

Each connection point also contains a metering unit accompanying the regulator unit to measure the volume of gas consumed.[2]

There are two categories of a Consumer Regulator station based on the demand profile and type of premise it supplies:

- I&C Regulator station; and
- Domestic Regulator.

3.1.1. Industrial / Commercial Regulator Stations

I&C regulators supply varying outlet pressure ranges from 1.1kPa up to 100kPa depending on the customers' requirements and system pressure capacity. As shown in Figure 3, an I&C installation can be either single run or dual run depending on the customers' reliance on a continuous gas supply and the impact an outage will have on their processes.

Single Run I&C Stations

Single run consumer regulator stations consist of the meter and regulator unit installed along one run. There is also the option to design a single run station so that one run is metered and one is manually operated called a "single run with bypass".

Dual Run I&C Stations

Dual Run meter/regulator units consist of two automatically operated pressure reducing legs with a regulated bypass and are typically used where continuity of supply is required.

Figure 3: I&C Type Consumer Regulator Station

1 As of June 2021.
2 Refer to document AMS 30-54 *Meter Management Strategy*.

3.1.2. Domestic Regulators

Domestic regulating stations supply residential customers (Tariff V). The standard metering pressure for a domestic customer is 1.1 kPa for low, medium or high pressure residential services, and 2.75 kPa for high pressure new residential installations. Domestic regulator stations installation can range between single regulator-meter installations existing at the side of a house to multiple regulator-meters installed in a stack, as typically seen in the Meter Rooms that supply multiple apartment units. Refer to Figure 4 below.

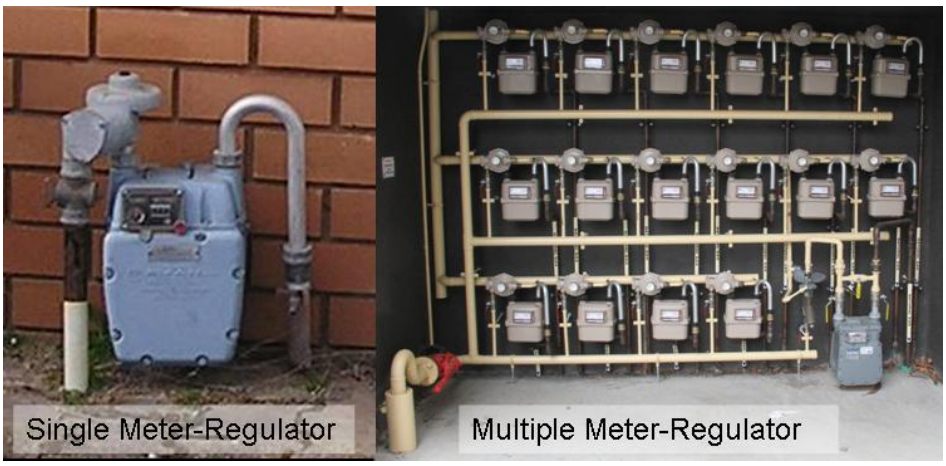

Figure 4: Domestic Regulator Station

Figure 5 labels the components of a typical domestic gas meter setup.

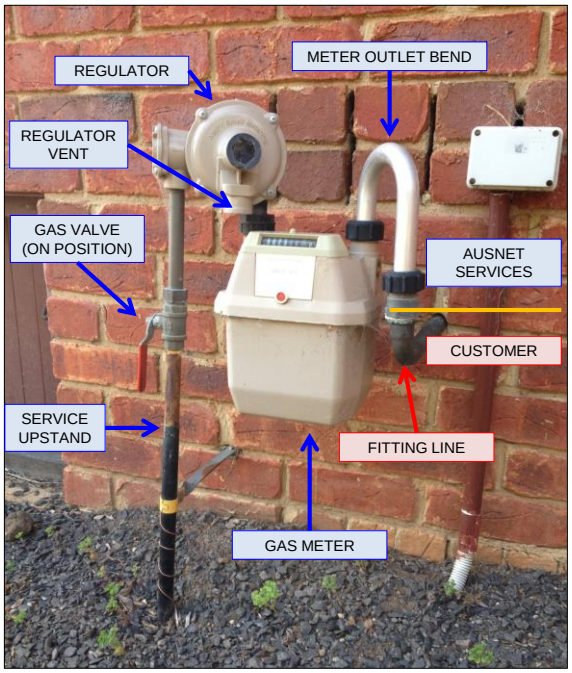

Figure 5: Typical Domestic Gas Meter Setup

3.1.3. Other Consumer Regulator Stations

Black Box

A "Black Box" type regulator facility, as shown in Figure 6, can be distinguished from regular domestic and I&C regulators as these are installed inside a pre-fabricated enclosed pit assembly. Black boxes are used to avoid high pressure gas entering commercial or occupied buildings and usually regulate the pressure down to 3 kPa outlet.

Figure 6: Black Box

Metering Room

A room specifically constructed for the housing of gas metering infrastructure and comprising of a minimum of 2 walls, ceiling and a means of entry/exit for a person.

Enclosures

Enclosures typically consist of a wire cage protecting the meter regulator installation from damage and unauthorised entry. The general structure of a metering room and an enclosure are illustrated in Figure 7.

Figure 7: Metering Room and Enclosure

3.2. Asset Profile

Regulators are classified as either *system operations* or *non-system operations* units.

All domestic and black box consumer regulators are non-systems operations units and these assets are not individually recorded in the SAP database. System operations units are captured in the SAP database. Approximately 11% of I&C regulators are systems operations units.

Unlike meters in the network, AusNet Services does not record domestic regulator data. These units are therefore treated as meter-regulator units. The age profile of domestic regulators is not known as this asset class is not captured in the SAP database or Hansen[3] and installation dates are not readily available.

The age profile of 'systems ops' classed I&C regulator sites is depicted in Figure 8.

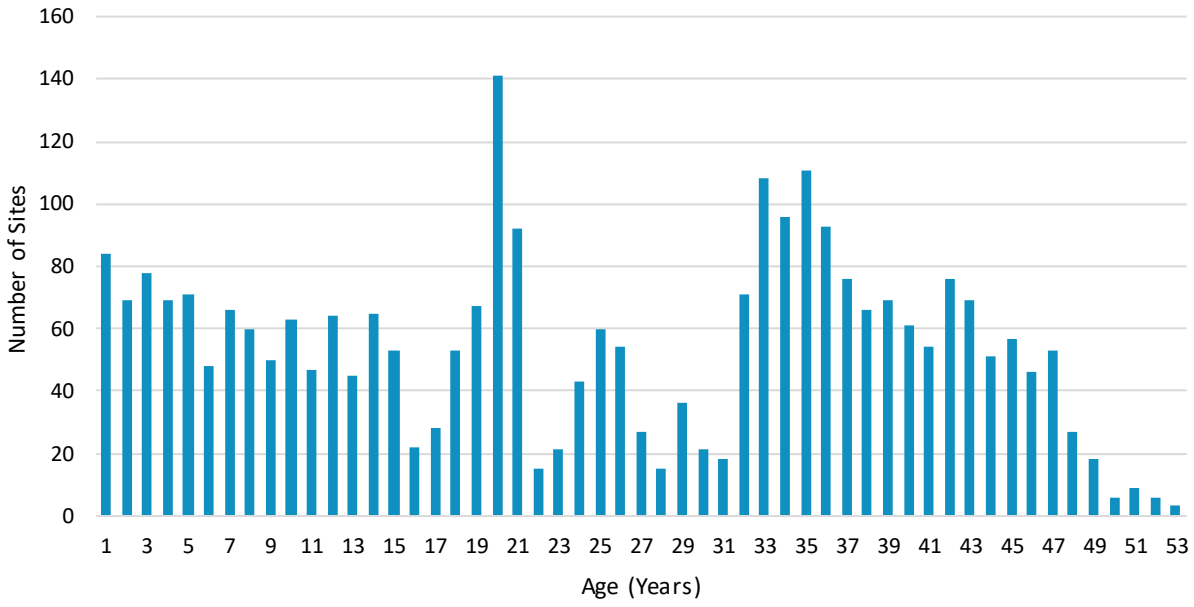

Figure 8: Age profile of I & C Regulator Sites

Figure 8 depicts a relatively young profile for I&C 'system operations' sites, with approximately 70% of these assets having an age of 25 years or less.

[3] AusNet Services' Meter Data Management (MDM) system

3.3. Asset Performance

3.3.1. Industrial & Commercial Regulator Stations

Faults over the period January 2016-December 2021 were analysed. The total number of annual faults / breakdowns in the last six years is depicted in Figure 9.

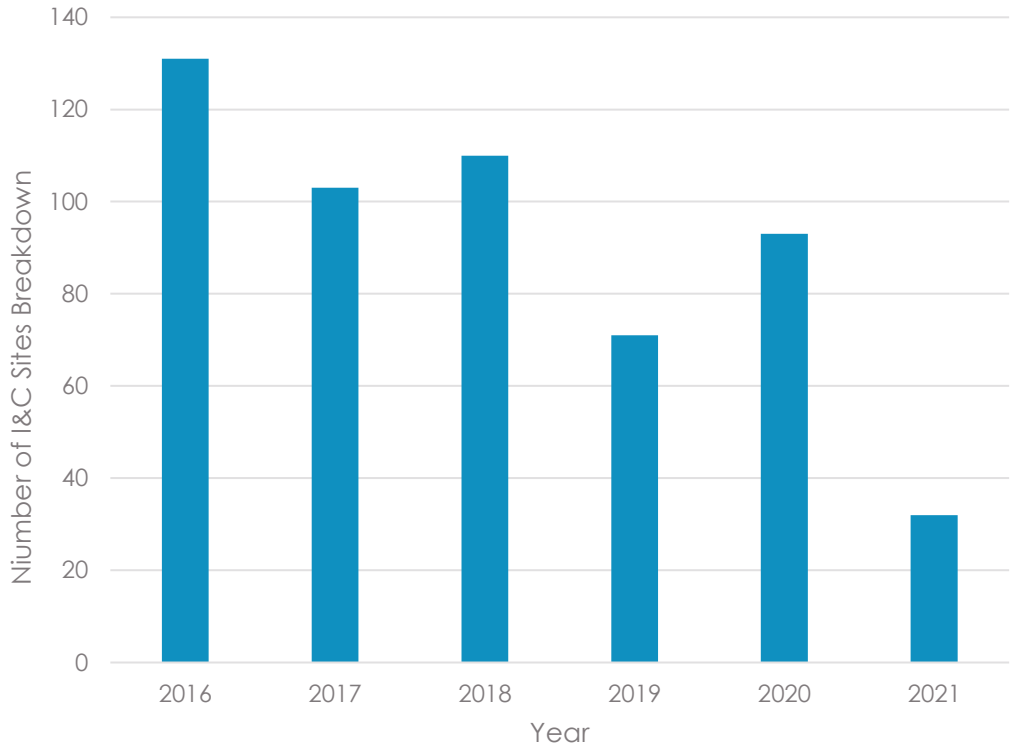

Figure 9: Faults[4] of I&C Regulator Stations 2016 - 2021

Over the last six years, the average number of faults / breakdown experienced on I&C sites within the network are 7.5 per month. However, there is no clear trend in the nature of faults and the type of equipment on which they occur.

3.3.2. Domestic Consumer Meter-Regulator Units

A meter leak is classified as a leak on a gas meter, valve, regulator or meter inlet and these leaks account for an average of 78%[5] of all leaks on the gas network, with the remaining 22% attributed to mains and service leaks.

A measure of the performance of these assets is the number of recorded Domestic Meter Leaks per 1,000 Customers. However, this measure does not differentiate between leaks that occurred on the meter or the attached regulator unit. The trend of domestic meter leaks is shown in Figure 10.

4 Extracted from the breakdown maintenance notifications in SAP.
5 Annual average from 2016 to 2020.

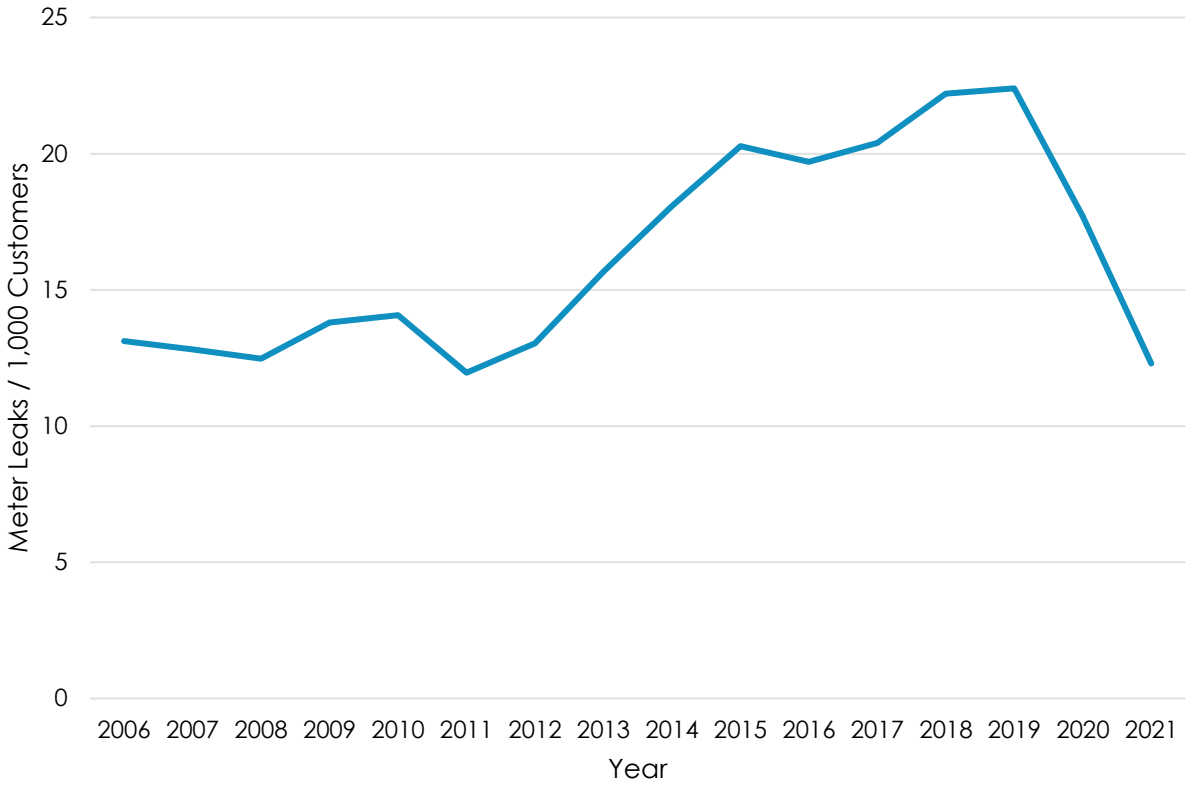

Figure 100: Domestic Meter Leaks / 1,000 customers

A rising trend for leaks on meters since 2011 ('meters' includes the regulator) has heavily influenced the network leakage rate which attributes more than three-quarters of those leaks as occurring at meters. In 2020 and 2021, the meter leaks have returned to pre-2011 levels, from the all-time high recorded in 2019. The 2021 overall fault rate is 1.2% for existing meter installations.

Over the years, the increases in recorded meter leaks correlate with the increasing failure rates of domestic regulators. The trend seen in Figure 10 can be attributed to the rise in domestic regulator leaks. Under the current practice of reactive replacement of domestic regulators (i.e. upon failure), the field fault rate of domestic regulators could double by 2028.

Analysis of historical data (2016 – 2020) suggests that around 80% to 90% of 'meter leaks' actually occur on a component of the regulator unit, and in almost all of those cases the regulators had to be replaced.

Figure 11 shows the total annual volume of reactive domestic regulator replacement due to faults being identified after the reports of 'meter leaks' from 2016 to 2020.

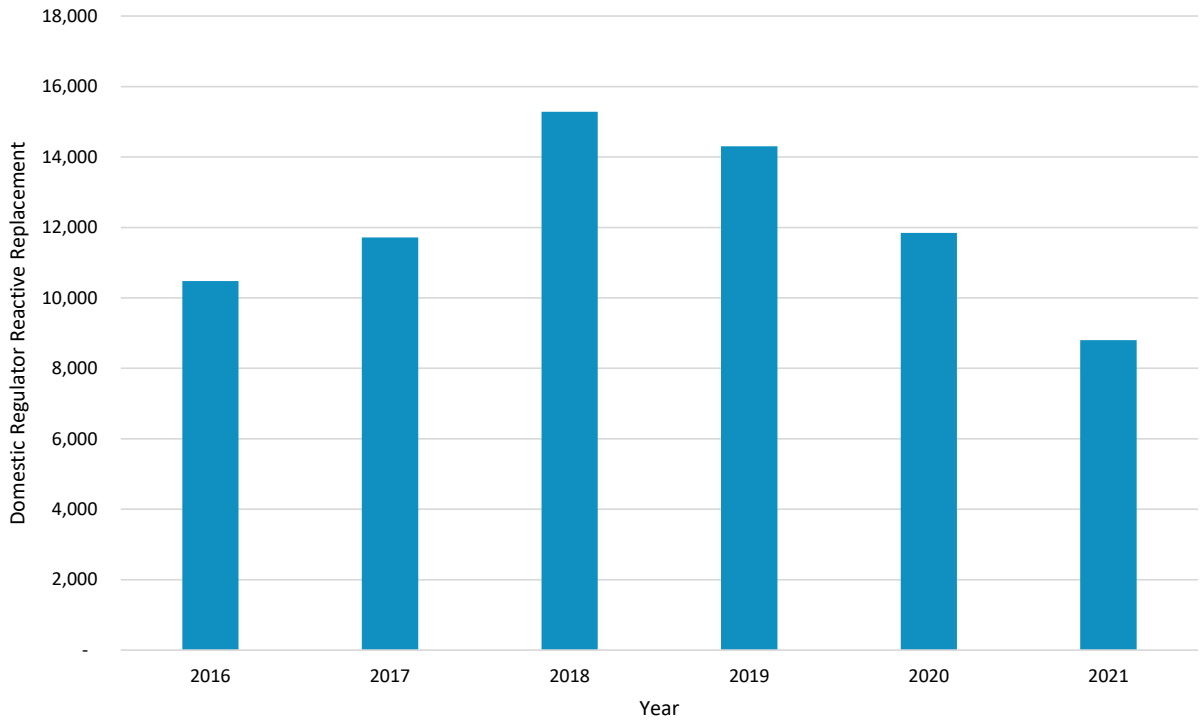

Figure 11: Domestic Regulator Replacement Due to Faults 2016 - 2021

4. Risks

The following describes the risks associated with the operation of both domestic and I&C regulators within the gas network.

4.1. Domestic Regulator Risk

The following are consequences associated with domestic regulator failure:

- A gas leak from a residential regulator results in gas escape. The leak in conjunction with an ignition source has the potential to ignite and may cause damage to property or public.
- The regulator failing in the closed position results in poor supply pressure to the customer or an outage.
- The regulator failing in the open position results in over pressure through the downstream fitting line and internal appliances. If the material and equipment are not equipped to deal with higher pressure, this may result in failure.

A consequence of leaking regulators is failure to maintain network safety. The *Gas Safety Act 1997* prescribes a maximum penalty of 1,500 penalty units for non-compliance with Clause 32. Clause 32 relates to the general duties of gas companies in ensuring that facilities are maintained and operated to as far as practicable minimise any hazards and risks to the safety of the public and to customers.

Under the GDSC, AusNet Services is required to provide a compliant metering installation at each supply point off the distribution network; it is therefore critical that the domestic regulators are operated and maintained safely.

4.2. Large Industrial and Commercial Regulator Risk

I&C regulators provide gas to AusNet Services' largest customers. Failure at the point of the regulator can result in detrimental effects and is a substantial risk considering the volume of gas released. The following are consequences associated with I&C regulator failure:

- A gas leak from an I&C regulator results in a gas escape. The leak in conjunction with an ignition source has the potential to ignite and may cause damage to property or public and may cause a fatality.
- The regulator failing in the open position results in inlet pressures seen on downstream pipework.
- The regulator failing in the closed position resulting in poor on no supply to the customer. This can severely impact manufacturing processes and may result in loss of business to our customers.

It is critical that all sites are maintained adequately for safe operation, to minimise any hazards and risk to the safety of the public and customers.

5. Strategies

5.1. Domestic Regulators

5.1.1. Proactive Domestic Regulators Replacement

Historically, domestic regulators have not been subject to planned maintenance and have only been replaced when they are faulty. The main driver for maintenance on these units is a customer reporting weak or no gas supply or smelling/hearing gas escape through the regulator. Where a fault is confirmed on the regulator (rather than on the adjacent meter or pipework), the regulator is replaced.

The historical strategy is leading to increasing risk due to the volumes of leaking regulators. Due to this increasing risk, a strategy involving the proactive replacement of regulators has been proposed. This strategy involves the replacement of a regulator concurrently with the Meter Replacement Program where certain meter families are proactively 'retired'.

If the regulator was replaced at the same time as the meter (i.e. during the Meter Replacement Program), this would significantly decrease the labour component of the regulator change as only a small incremental labour cost would be incurred.

A program involving replacement of regulators at the time the meter is replaced will result in economic replacement of most regulators. The program should result in most regulators meeting or exceeding their 15-year design life, will reduce the number of gas leaks and should arrest the increasing gas leak trend. The annual volume of domestic regulator replacement is depicted in the below Table 2.

Table 2: Domestic Regulator Replacement in Conjunction with Time Expired Replacement Program

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]					

5.1.2. Reactive Domestic Regulators Replacement

The predicted failure rate and volume of reactive domestic meter replacement for 2024-2028 is forecasted based on historical performance over a 5 year period. Figure 123 displays the projected number of domestic meter faults, which is extrapolated from the actual volumes of meter failures from 2016 to 2020. By applying the average of the projected fault replacement, it is forecast that [C.I.C] domestic regulators will be reactively replaced per year over the regulatory period. Due to the volume of reactive replacements plateauing reducing in recent years, the lower bound of the forecast was used for the forecast volume estimate for the access arrangement period.

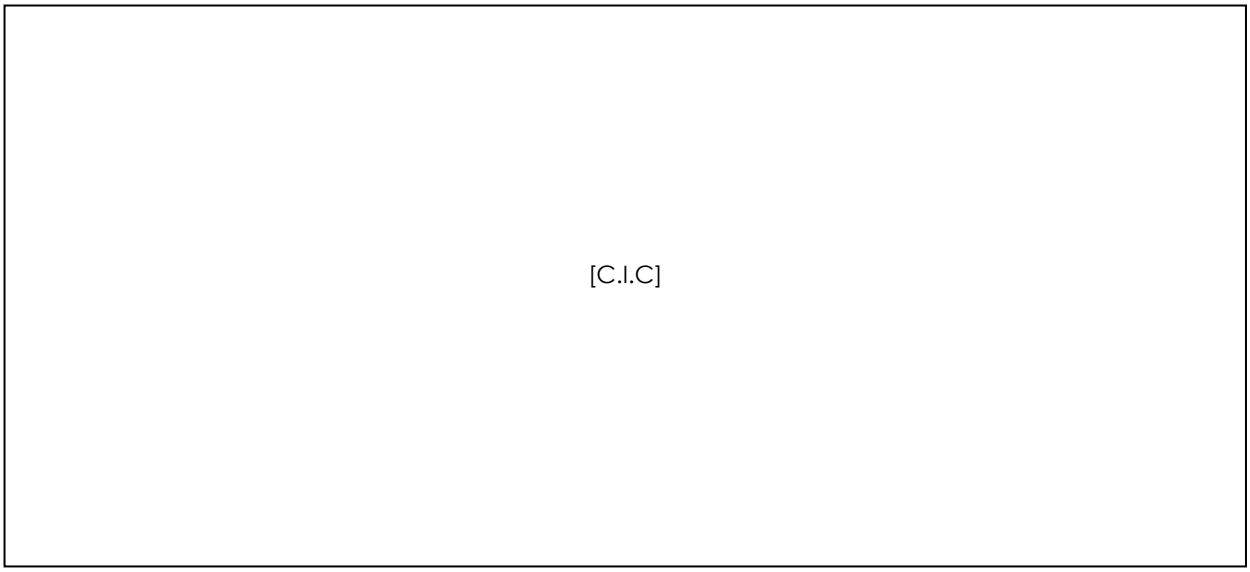

Figure 12: Forecast domestic meter faults requiring reactive replacement

Table 3: Reactive Domestic Regulator Replacement

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]					

Strategies

- Replace domestic regulators at the time the meter is replaced;
- Continue with no scheduled maintenance on domestic regulators; and
- Reactively replace faulty regulators that are found to be inoperable in the field.

5.2. Small Commercial and Large I&C Regulators

5.2.1. Maintenance

All large (systems operations) I&C regulators[6] are recorded in the SAP database and are subject to the following maintenance regime as per the OPEX covered in the regulatory period:

- Operational Check – 6 monthly; and
- Full Operational Check – 12 monthly.

This maintenance schedule allows the integrity of these assets to be maintained.

A full overhaul/upgrade is completed every 6 year or 10 years, depending on the type of asset. This maintains the safety and integrity of the asset by upgrading degraded components, undertaking performance tests, recalibrating set points, and touching up paintwork where required.

[6] I&C regulators that have a metering pressure of 4 kPa or greater with an automatic overpressure protective shut-off device installed.

Figure 13: I&C regulator undergoing Full Overhaul

This maintenance and overhaul program is critical in maintaining the effectiveness and safety of the regulators provided spare parts are available. The program ensures that fault and leakage rates are maintained at acceptable levels.

Metering Rooms contain multiple gas meters typically for the purpose of supplying apartment blocks, shopping centres, or sporting arenas (where there are multiple consumers populating a premise). There are 197 metering rooms installed within the gas network. Metering Room assessments are performed in accordance with AusNet Services' Technical Standard (TS 4356). The priority of works is based on identified sites that require:

- improved and compliant venting systems;
- signage, security locks and updated emergency contact details; and
- intrinsically safe electrical installations.

The outcome of Metering Room assessments leads to the identification of rectification works required to meet compliance with TS 4356 and therefore current Australian building code requirements.

The primary driver behind carrying out such assessments is safety. Metering rooms are typically located near high density residential houses. Natural gas is highly flammable and in the event that gas leaks into a confined space and a source of ignition exists, the resultant explosion has the potential to destroy the property, and cause injury to the public. The repair and upgrade to "out of specification" metering rooms ensures that those installations are safe and do not pose as a hazard to the public.

5.2.2. [C.I.C] I&C Regulator Replacement

The old [C.I.C] series gas regulators are typically installed on commercial or small industrial installations. These regulators are now obsolete, with spare parts required for 6-yearly maintenance becoming increasingly more difficult and expensive to source. As such, their replacement with a modern equivalent, [C.I.C] type regulator, has been identified as a project to prevent operational costs increasing over the long term. There are forty-five (45) sites recorded in SAP (plant maintenance). However, being a legacy issue, it has been noted that the data attributes actual volume of the type of regulator in the field were not accurately captured. A provision of twenty-five (25) unknown sites are anticipated as part of the replacement program. Refer to Table below.

The sites to be replaced are to be selected based on the schedule of sites planned for full maintenance. In this way cost efficiencies will be realised through alignment of the replacement with planned preventative maintenance activities.

Table 4: [C.I.C] I&C Regulator Replacement

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]					

5.2.3. [C.I.C] I&C Regulator Replacement

The [C.I.C] series gas regulators are generally installed on commercial or small industrial installations. Historically, this type of gas regulator is either a partial or full capacity internal relief regulator and provides a means of over pressure protection to the downstream pipework and equipment at the customers' premise.

This type of gas regulator installation can mostly be found to regulate the flow of gas at the high-pressure inlet of the meter assembly. In the event of fault or failure of the regulator, a significant amount of gas will be released to atmosphere due to its design and characteristics. It is a known safety issue from an operational perspective that it should be addressed.

To mitigate the safety and operational risk, a replacement program is planned. There are twenty-three (23) sites that this type of regulator is installed and will be required to replace with the modern equivalent, [C.I.C] regulator model. Similar legacy issue as the [C.I.C] regulator type described in Section 5.2.2 above, a provision of ten (10) unknown sites are anticipated as part of the replacement program. Refer to Table below.

Table 5: [C.I.C] I&C Regulator Replacement

PROGRAM	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]				

5.2.4. [C.I.C] Replacement

Actuators are typically used within large I&C sites to control the operations of inlet valves at transmission operation pressure. Historically, the models of [C.I.C] have been installed. The majority of these types of actuators are over 40 years old and are past the useful operational life. In addition, spares availability is an issue as there are no longer supported by the manufacturer. To mitigate the operational risk in an event of failure and non-availability of spares, a proactive program is initiated to gradually replace ageing and unsupported [C.I.C] series actuators.

There are seven (7) sites are identified for replacement.

5.2.5. Miscellaneous I&C Works

I&C regulators occasionally experience failures which necessitates replacement of low value capital items at consumer regulating stations that have either failed in operation or have been identified through risk assessment (safety or network risk) as requiring urgent replacement.

An ongoing program is necessary to reduce (eliminate) identified network safety risks and to maintain network compliance and / or performance.

All items must meet each of the following criteria:

1. ***Replacement*:** Replacement of an existing asset only.
2. ***Low capital value*** (~ <$20k).
3. ***Reactive in nature*:** Expenditure is to be reactive in nature through failure of the existing asset or identified as requiring urgent replacement through risk assessment.

Example projects may include the replacement of:

- mechanical protection bollards within regulating compounds;
- enclosures;
- pipe supports, valves, etc;
- filters; and / or
- auxiliary equipment.

Table 6 shows the volume of I&C regulator reactive replacement that is forecast for the regulatory period.

Table 6: Forecast I&C Regulator Reactive Replacement

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]					

Strategies

- Continue with routine scheduled maintenance of I&C regulators and inspection of metering rooms as per the OPEX covered in the regulatory period;
- Implement a program to replace obsolete [C.I.C] regulators with a modern equivalent; and
- Implement a program to replace [C.I.C] regulators with a modern equivalent; and
- Implement a program to replace obsolete [C.I.C] with a modern equivalent; and
- Continue to replace items and regulators at consumer regulating stations that have failed in operation or identified through risk assessment as requiring urgent replacement

6. Alignment with Network Objectives

Each program described under this strategy is aligned to at least one of the AusNet Services' gas network objectives.

Table 7: Alignment of Consumer Regulator Strategies with Gas Network Objectives

PROGRAMS	GAS NETWORK OBJECTIVE			
	Maintain Network Safety	Maintain Operating Efficiency	Undertake Prudent & Sustainable investment	Deliver Valued Services to Customers
Replace domestic regulators in line with meter replacement	X		X	X
No scheduled maintenance on domestic regulators		X	X	
Reactive domestic regulator replacement	X		X	X
Routine maintenance of I&C and Meter Rooms	X	X		X
	X		X	X
[C.I.C]	X		X	X
	X		X	X
Replace miscellaneous I&C Regulators[7]	X		X	X

[7] Includes allowance for reactive regulator replacement i.e. replacement upon regulator failure.

7. Detailed CAPEX Requirements

7.1. Phasing and Financial Disclosure

All programs are defined in Australian financial years, aligning to regulatory years from July until June of the ensuing year.

All financial figures quoted within this document, including all historic and forecasted expenditure – unless otherwise specifically stated – have the following characteristics:

- Real Expenditure / Cost (reference year = 2021);
- Direct Expenditure only (i.e. excludes overheads and corporate finance costs); and
- In units of $1,000 (i.e. '000).

7.2. Summary of Programs

Table 8 summarises the total capital expenditures of all regulators replacement programs for 2024-2028 regulatory period, which are described and presented in this strategy document.

Table 8: CAPEX summary 2024-2028 Regulatory Period ($2022, $'000)

PROGRAM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]					

AusNet Services

Level 31
2 Southbank Boulevard
Southbank VIC 3006
T +613 9695 6000
F +613 9695 6666
Locked Bag 14051 Melbourne City Mail Centre Melbourne VIC 8001
www.AusNetservices.com.au

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