AusNet

Gas Network

Network Regulator Strategy

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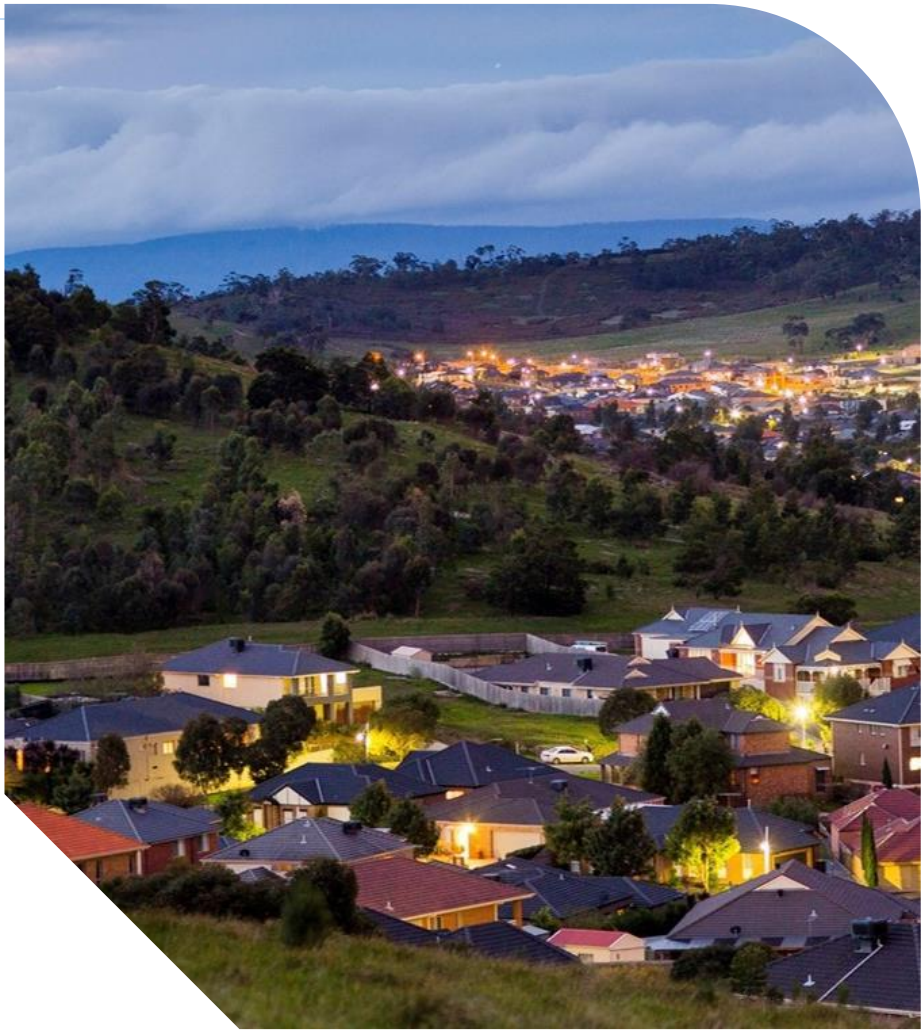

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Table of contents

Executive Summary

This document outlines the strategy to maintain safe and reliable operations of City Gate, Field Regulators and District Regulator assets for the 2024-28 access arrangement period. These assets perform a critical function in delivering gas from the principal transmission pipelines and reducing the pressure to safely distribute gas to end users. The strategy provides overview and analysis on asset performance, risks and investment required within the stated period to maintain safe and reliable operation.

Over the last regulatory period, AusNet Services has undertaken prudent measures such as priority upgrades of ageing / non-performing City Gate and Field Regulator assets and implementation of additional Type B maintenance regimes on City Gate heaters. These measures have proven to be effective and have lowered the unplanned faults and failures associated with this asset class.

AusNet Services endeavours to manage network risk in order to maintain compliance with the various codes and acts including:

- The Gas Safety Act;
- The Pipelines Act;
- The Gas Distribution Code; and
- AusNet Services Gas Safety Case.

Further to this AusNet Services has 7 key network objectives to which the gas network is operated to. These objectives are:

- Maintain network safety in accordance with the Gas Safety Case;
- Maintain top quartile operating efficiency;
- Undertake prudent and sustainable network investment;
- 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.

In depth performance review of individual asset class has identified the following broad risk categories which have the potential to impact the network safety and /or reliability and have been considered in the recommendations for the 2024-28 access arrangement period:

- Ageing infrastructure
- Reliability issues associated with [C.I.C] regulators
- Safety issue associated with [C.I.C] regulators
- Supportability issues associated with [C.I.C] actuators
- Security Legislation Amendment (Critical Infrastructure) Bill 2020 - Site security

Table 1 below provides overview on CAPEX requirement associated with this asset class for the 2024-28 regulatory period.

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

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

1. Document Overview

1.1. Purpose

This Asset Management Strategy articulates AusNet Services' approach to the management of its network regulator assets. The strategy details the asset performance, risk and investment requirements to support delivery of safe and reliable gas services.

1.2. Scope

The scope for this strategy incorporates the following asset categories:

- City Gates
  - Regulators
  - Heaters
  - Ancillary Equipments (valves, actuators, pipework, building, fence etc)

- Field Regulators & District Regulators
  - Regulators
  - Ancillary equipment (Valves, actuators, pipework, pit etc)

1.3. Asset Management Framework

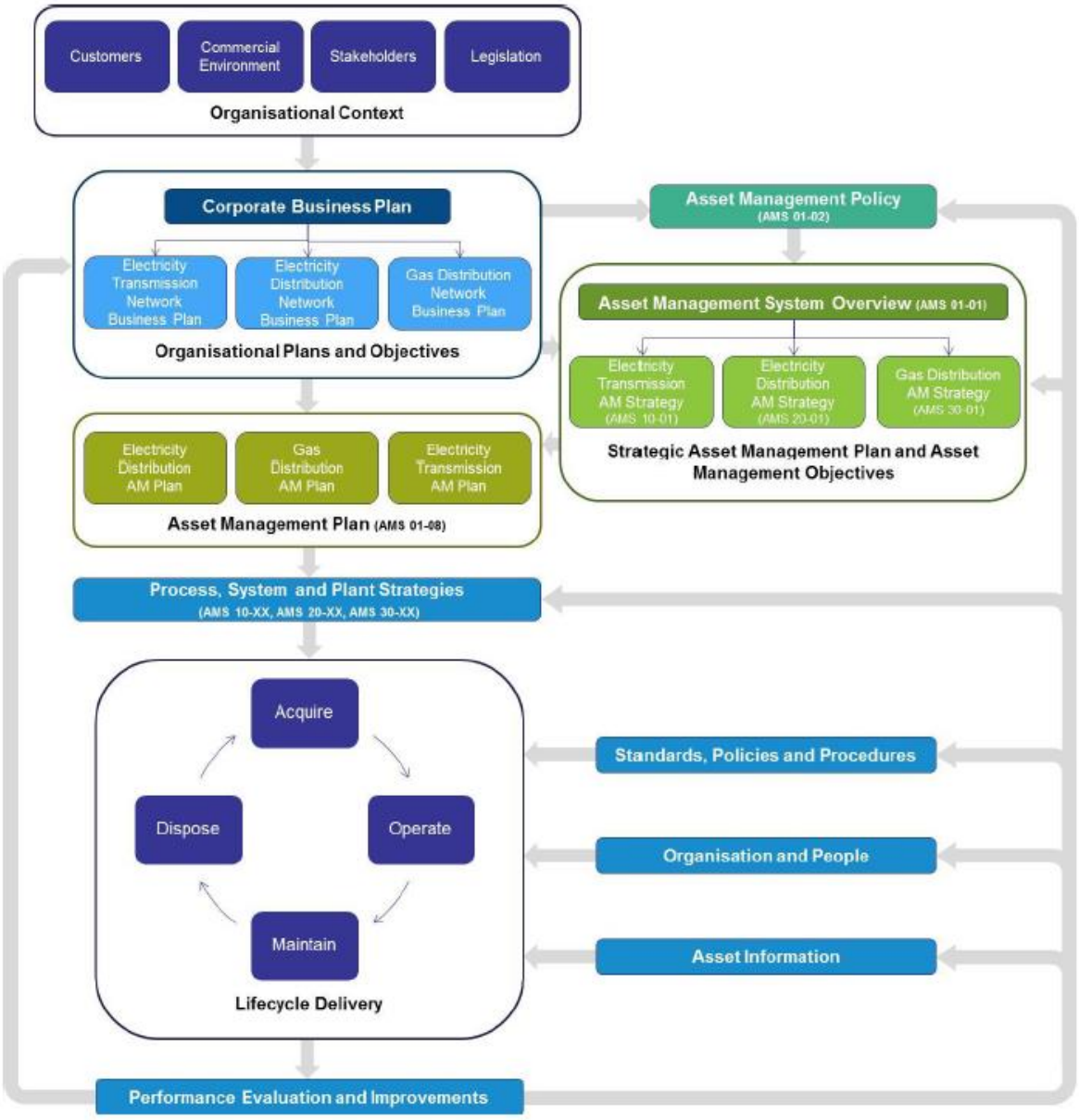


Figure 1 below provides an overview of AusNet Services asset management framework. This framework is centred around the objective to operate the network in top quartile of efficiency benchmarks with an aim to care for customers and strive to make energy more affordable.

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.

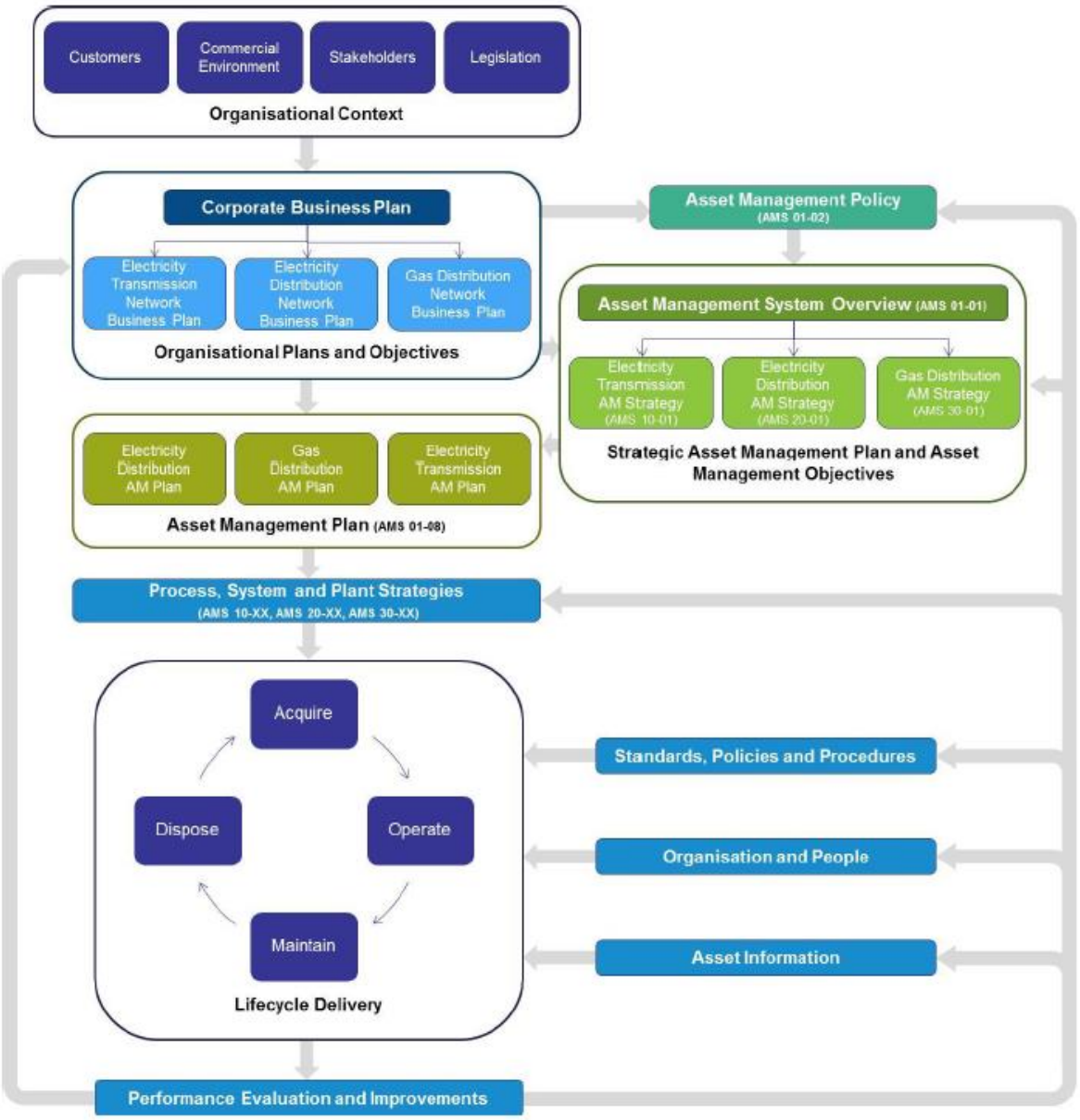


Figure 1: Ausnet Services Asset Management Framework

1.4. References

The following regulations and requirements are applicable to and influenced the design, operation and maintenance of the Regulator asset class:

- Australian Standards
- AEMO Gas Quality Guidelines
- AusNet Services – Technical Standards and Procedures
- Asset Management Strategy – Gas Networks (AMS 30-01)
- Energy Safe Victoria Guidelines
- Gas Maintenance Plan (30-02)
- Gas Safety Act 1997
- Gas Safety Case (GSC 10-00)
- Gas System Contingency Plan – (AMP 30-05)
- Gas Distribution System Code
- Work Health & Safety Regulations

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.

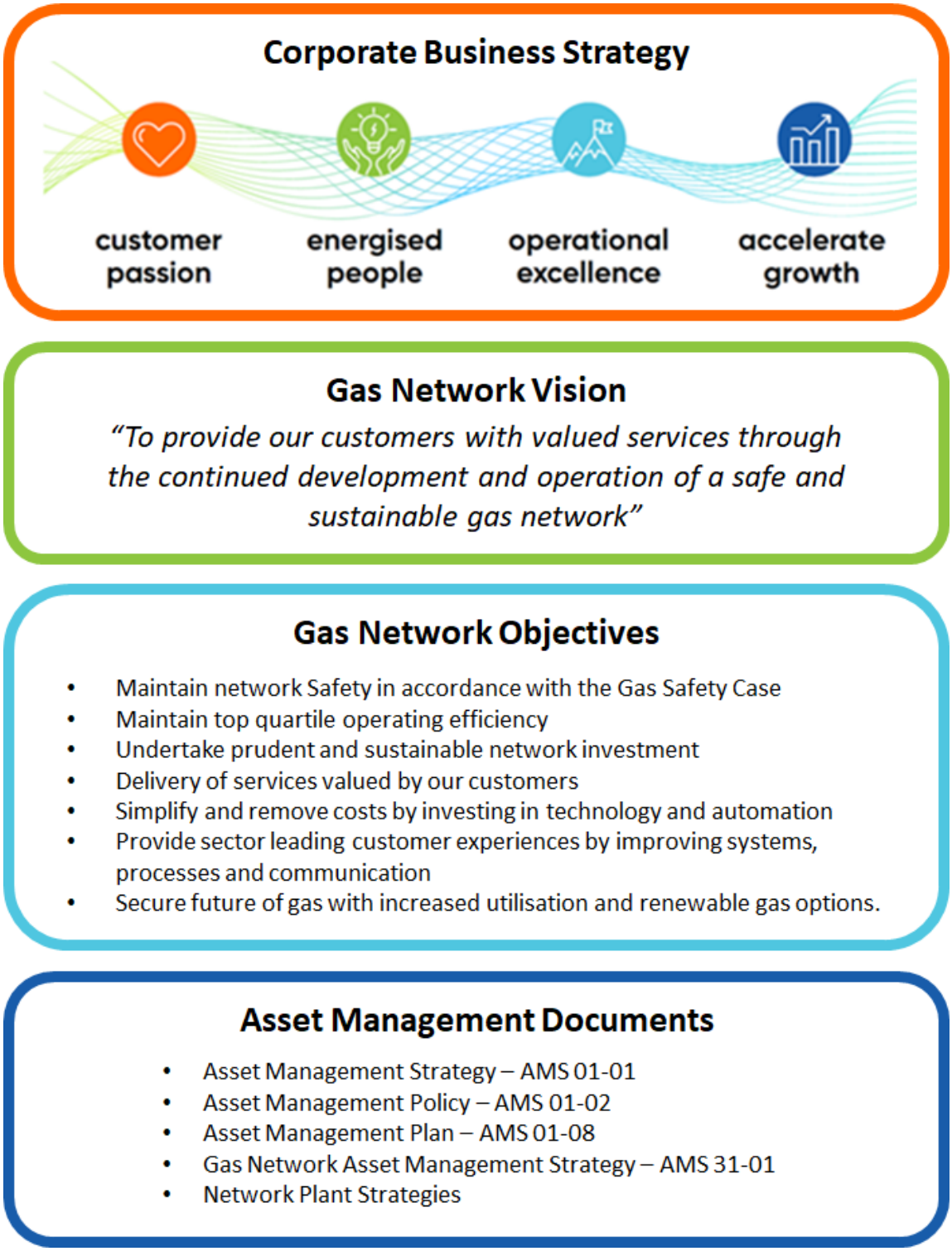


Figure 2: The Business Strategy, Network Vision and Objectives all centre around our customers

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. Gas Network Overview

Figure 3 below shows the geographical coverage of AusNet Services' gas network assets covered under this strategy:

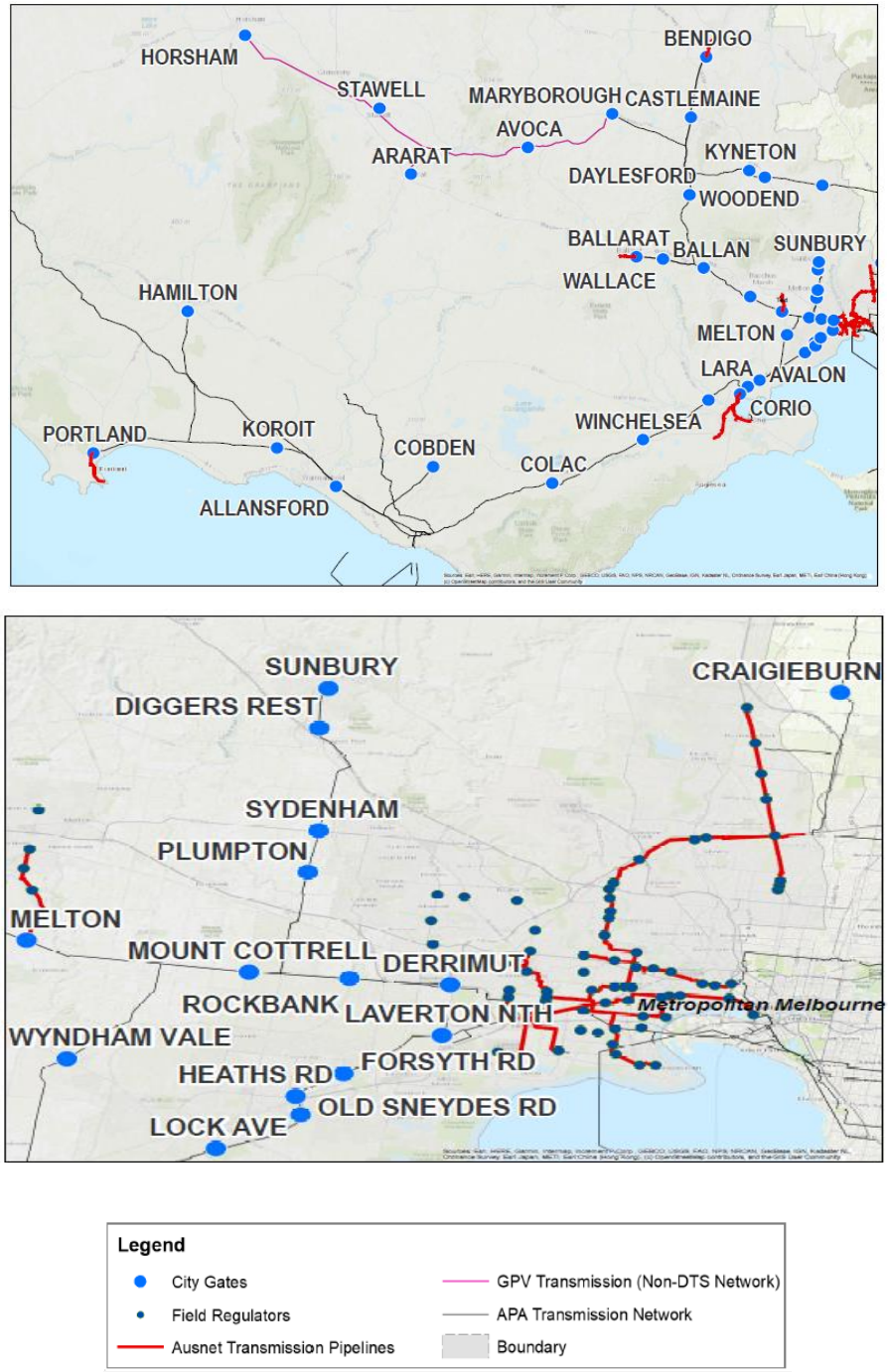
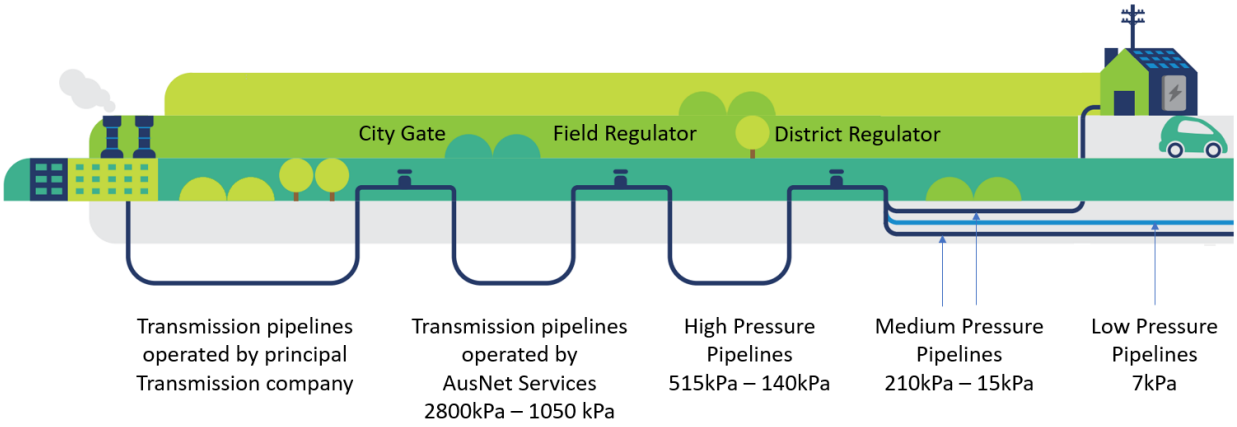


Figure 3 – Location of Key Gas assets

4. Asset Overview

4.1. Introduction

The Network Regulator Strategy encompasses three classes of regulator facilities designed to deliver gas from the transmission system and safely distribute to AusNet Services' customers. Each class of regulator facility is assigned by the pressure it operates at, as indicated by Figure 4 below.



Note: There are instances where 1. City Gates take gas directly from the principal transmission pipeline and inject into high pressure distribution network and 2. Field Regulators take gas directly from AusNet Services' transmission pipelines and inject into the medium pressure distribution network.

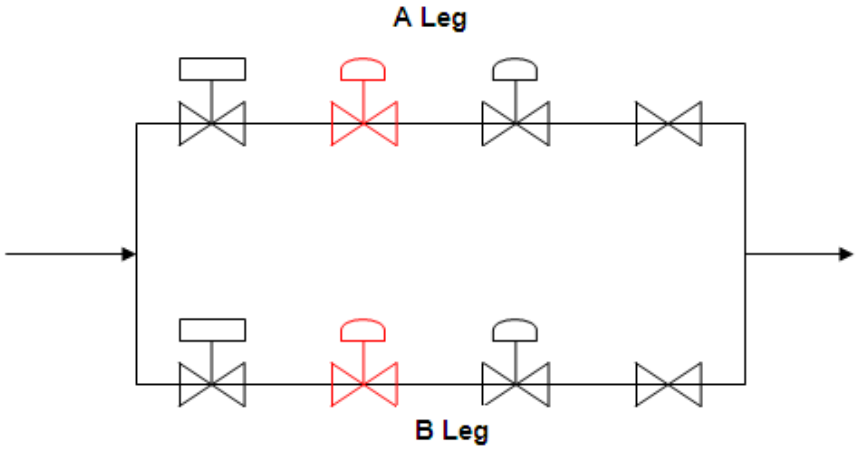
Figure 4: Schematic of Regulator station asset classes

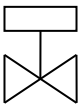
A summary of AusNet Services' Gas Network Regulating facilities is shown in Table 2 below.

Table 1: Network Regulator Asset Base – September 2021

ASSET TYPE	NUMBER OF SITES
City Gates	41
Field Regulators	107
District Regulators	44

The general arrangement of a City Gate, Field Regulator and District Regulator including the critical components in the pressure reduction process is depicted in Figure 5 below. All pressure regulating stations have an A and B leg. For non-SCADA remote controlled stations only one leg is operational at any time with the second leg being a back-up to take over supply should a failure occur on the operating leg.



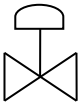


Slam Shut Valve

Automatically shuts off supply through the station when high outlet pressure is detected downstream.

Monitor Regulator

Redundant regulator which takes over pressure reduction control in case of primary regulator failure.



Primary Regulator

The working regulator which is responsible for the pressure reduction process.

Isolation Valve

Manually operated valve which allows supply through the station to be isolated. Generally, only utilised to allow maintenance to be performed on the station.

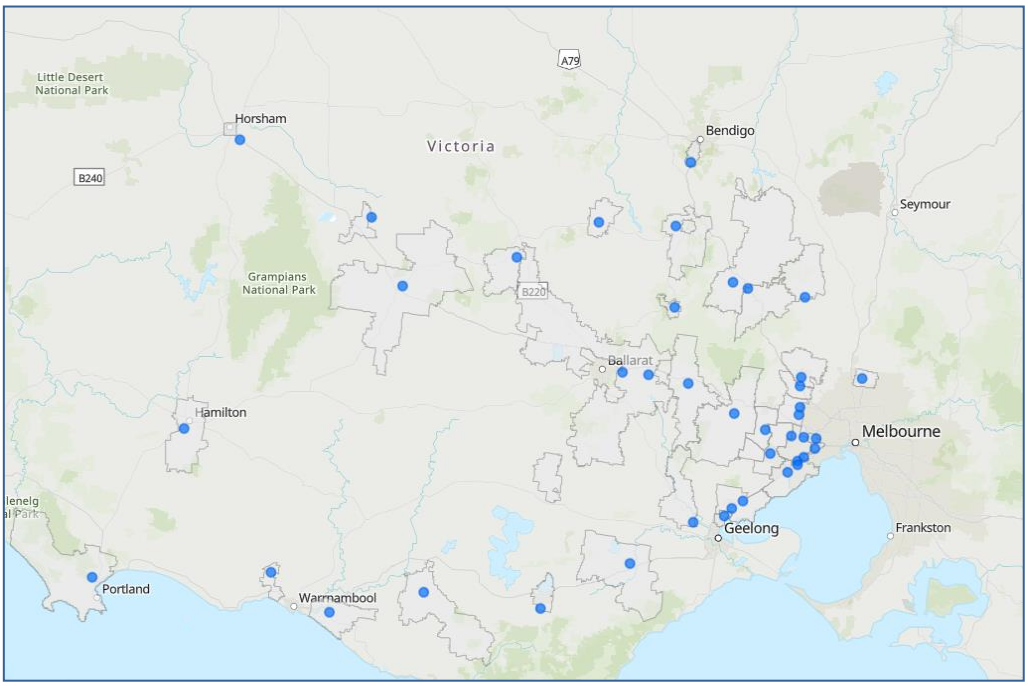
Figure 5: Schematic of pressure reduction station

4.2. Asset Profile

4.2.1. City Gate (CG)

A City Gate is a station that receives gas from the Victorian Transmission System (VTS) pipelines that operates at pressures above 2,800 kPa. The City Gate reduces the pressure below this level and injects the gas into AusNet Services' lower rated transmission pipelines. On some occasions City Gate sites reduce the gas pressure and inject the gas directly into AusNet Services distribution networks (High Pressure). All City Gates within AusNet network incorporate SCADA Control or Monitoring functionality.

There are 41 operational City Gates within AusNet services gas network. Figure 6 below shows the geographical location of the City Gates.



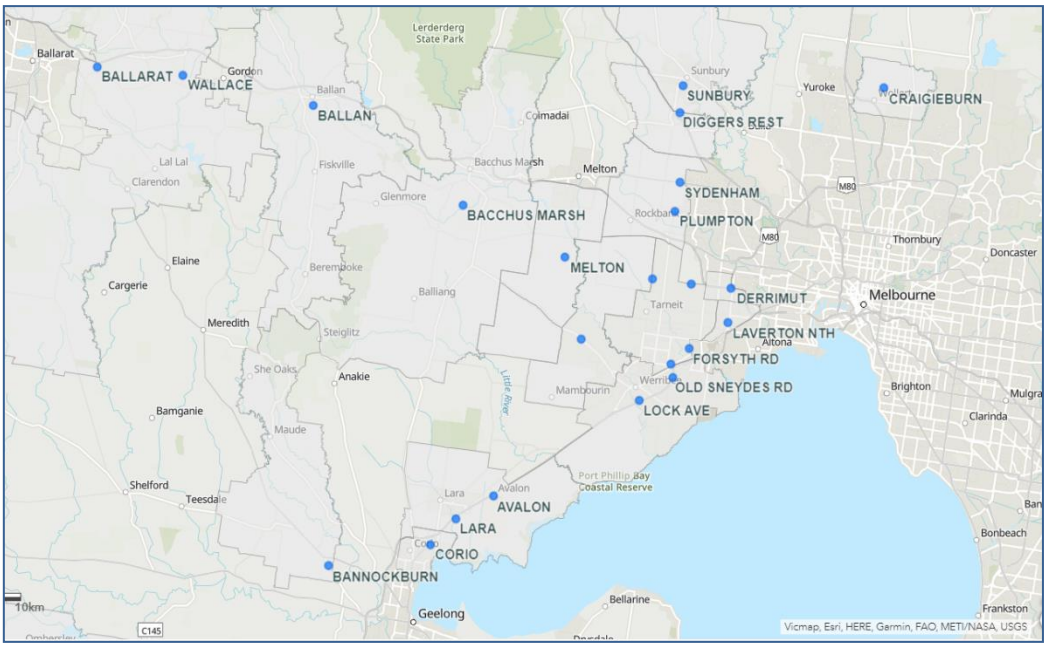


Figure 6 – City Gate Locations

Table 3 below provides a list of all the operational City Gates within the AusNet Services gas network:

Table 3 – City Gate Locations

SITE	LATITUDE	LONGITUDE
CITY GATE HORSHAM	-36.75634958	142.239996
CITY GATE ALLANSFORD	-38.3998947	142.6340508
CITY GATE LAVERTON NTH	-37.83538303	144.783344
CITY GATE HAMILTON	-37.76623892	141.9914974
CITY GATE COLAC	-38.38829879	143.5691641
CITY GATE HEATHS RD	-37.87907671	144.7059194
CITY GATE LOCK AVE	-37.91650015	144.6637203
CITY GATE SYDENHAM	-37.68910442	144.7179385
CITY GATE CORIO	-38.06658895	144.3820432
CITY GATE DERRIMUT	-37.79908235	144.7874905
CITY GATE DIGGERS REST	-37.6154084	144.7181444
CITY GATE DAYLESFORD	-37.3416707	144.1627593
CITY GATE ROCKBANK	-37.79466728	144.734283
CITY GATE KOROIT	-38.2618007	142.3785155
CITY GATE FORSYTH RD	-37.86278269	144.7310288
CITY GATE WALLACE	-37.57634267	144.0484229
CITY GATE SUNBURY	-37.58687212	144.7232954
CITY GATE LARA	-38.03976066	144.4157978
CITY GATE KYNETON	-37.25341846	144.4217536
CITY GATE OLD SNEYDES RD	-37.89219826	144.7083281
CITY GATE CRAIGIEBURN	-37.58997058	144.9935257
CITY GATE ARARAT	-37.26592296	142.9582414
CITY GATE STAWELL	-37.02483004	142.8218346
CITY GATE COBDEN	-38.32913906	143.0537032
CITY GATE BALLARAT	-37.56783006	143.9330337
CITY GATE BENDIGO	-36.83577584	144.2361374
CITY GATE AVALON	-38.01653078	144.4666424
CITY GATE BALLAN	-37.60824238	144.224407
CITY GATE BACCHUS MARSH	-37.71260943	144.426332
CITY GATE CASTLEMAINE	-37.05783074	144.1693677
CITY GATE PORTLAND	-38.28001086	141.5838146
CITY GATE MARYBOROUGH	-37.04518024	143.8288958

CITY GATE MELTON	-37.76742572	144.5636767
CITY GATE WOODEND	-37.27749146	144.4888742
CITY GATE LANCEFIELD	-37.30678853	144.7384658
CITY GATE PLUMPTON	-37.71866421	144.7121114
CITY GATE WYNDHAM VALE	-37.85193436	144.5848996
CITY GATE MOUNT COTTRELL	-37.79008202	144.6812082
CITY GATE WINCHELSEA	-38.23166001	143.962136
CITY GATE AVOCA	-37.16842183	143.4636261
CITY GATE BANNOCKBURN	-38.0886931	144.2447863

Regulators at the City Gate sites play a vital role in managing a safe and reliable downstream network pressures. The regulator does this by maintaining a predetermined set pressure downstream of the regulator. All City Gates have 3 levels of over pressure protection.

A summary of different types of regulators in use at AusNet Services City Gate sites is show in Figure 7 below:

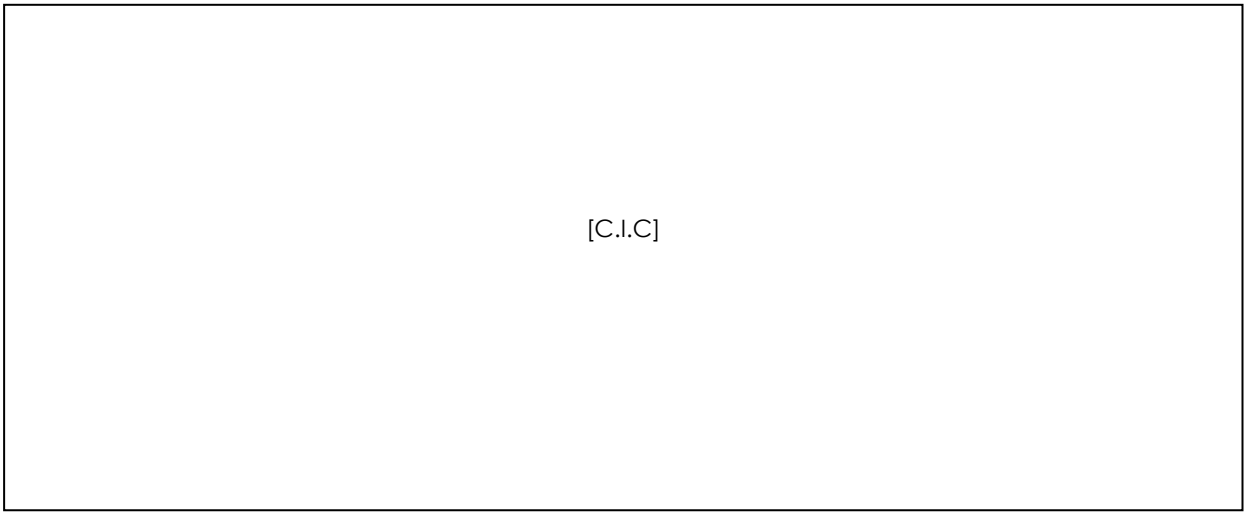


Figure 7 – City Gate Regulator Type

Heaters - AusNet Services currently has 39 heaters installed at various City Gate sites throughout the network. A heater is required at every City Gate site due to the large temperature drop caused by the pressure reduction process There are two different types of heaters used to provide the heating requirements at AusNet Services' City Gate sites:

Water Bath Heater – This is the most widely used type of heaters across the network. This type of heater utilises a gas burner to maintain the temperature of a large vessel of water. A gas pipe is then coiled through the water bath to allow the heat transfer process to take place. The water bath heater has been utilised at some of AusNet Services' older City Gate sites and are still being installed in new City Gate sites.

Heat Exchanger – This type of heater utilise a gas boiler to heat water which is circulated by an electric pump through a heat exchanger where the heat is transferred into the gas stream.

Figure 8 below shows the different types of heaters available at AusNet Services City Gate sites:

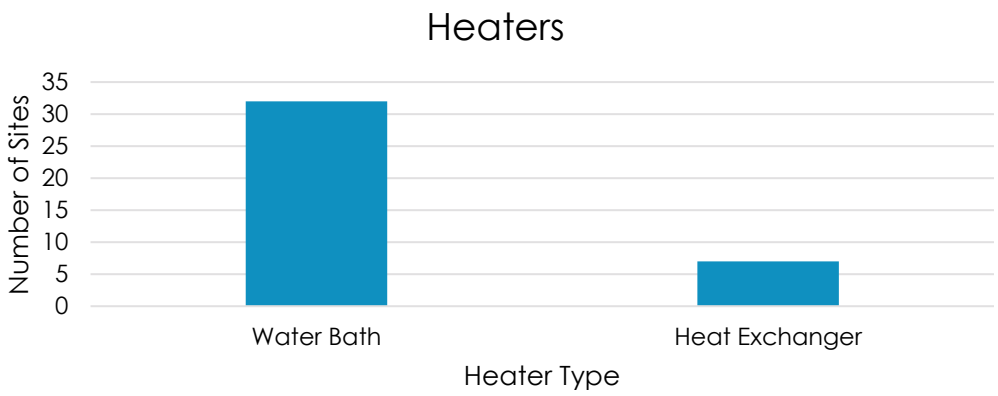


Figure 8 – City Gate Heater Type

4.2.2. Field Regulators (FR)

A Field Regulator is a station which receives gas from AusNet Services' transmission pipeline network at pressures up to 2,800 kPa. The Field Regulator then reduces the pressure below this level and injects the gas into AusNet Services' distribution networks running at less than 1050 KPa pressures. Field Regulators are dispersed relatively evenly across the network supplying District Regulators and Industrial and Commercial sites.

There are currently 107 operational Field Regulators within AusNet Services Gas Distribution network. Most of the Field Regulators are situated in underground pits. This allows Field Regulator installations to be located in populated urban areas as the underground pit requires less land space and poses a lower risk to the community should a major incident occur at the site. Some Field Regulator sites are located above ground both in a kiosk or secured compound.

As per the City Gate design, Field Regulators have dual regulator runs and 3 levels of over pressure protection to ensure pressure control is maintained at all times. Field Regulator stations are also equipped with SCADA monitoring, however due to the reduced pressure differential seen at these sites gas pre heaters are not required.

Figure 9 below shows the different families of regulators in use at AusNet Services Field Regulator sites:

[C.I.C]

Figure 9 – Field Regulator Type

4.2.3. District Regulators (DR)

The distribution system also includes 42 district regulators to supply gas to low pressure network.

District regulator installations are located in the older reticulated areas and may be above-ground (kiosks) or below ground (pits). Like Field Regulators, most district regulators feature dual regulator runs, however they require only 2 levels of over pressure protection, lacking the slam shut systems equipped to larger capacity, higher pressure, regulating units. Less critical district regulator sites feature single regulating runs, with bypass pipework for emergency use. Some district regulator stations are also equipped with SCADA monitoring, with the remainder featuring manual pressure recorders that record site pressure over time for later review.

As part of the mains renewal program, the low-pressure district regulators are being phase out as the network is upgraded to high pressure standards. Due to this declining demand, there is little requirement for new investment in district regulators other than maintaining the sites safety and reliability.

4.2.4. Coalescers

There are currently six coalescer units in operation. A coalescer is designed to extract liquids from the gas stream. The liquids in the gas stream are generally of the form of an oil substance which can be generated from hydrocarbon drop out or from lubricating oil utilised in the gas compressor stations. Liquids in the gas stream is undesirable as it can cause damage to assets including regulators and meters, the liquids can also cause major damage to customers appliances.

To mitigate the risk of liquids in the gas stream, coalescers were installed in 2005/2006 at strategic locations where liquid related issues were most predominant.

Given the recent history of liquids extracted from AusNet Services' gas network, the strategy outlined above appears to have adequately mitigated this risk.

4.3. Age Profiles

4.3.1. City Gate (CG)

There are 41 operational City Gates within AusNet services gas network. Figure 10 below shows the age profile associated with the operational City Gates with AusNet gas network:

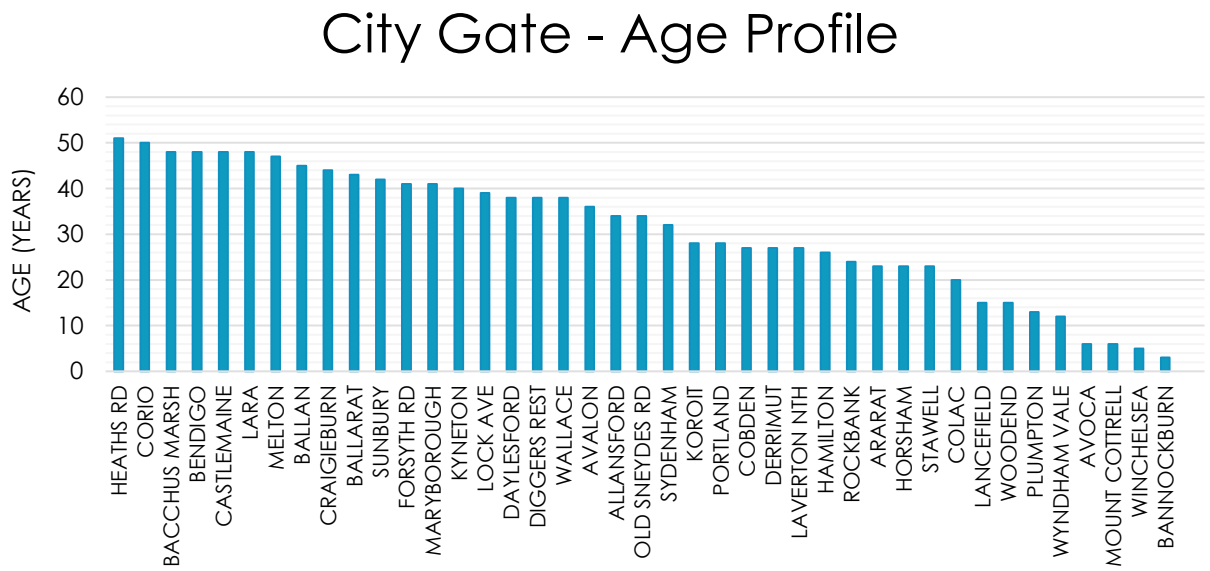


Figure 10 – City Gate Age Profile

Many City Gates were commissioned in early 1970's and have been operational since. As Victoria continued to grow additional City Gates were commissioned within the gas network with the latest ones being the regional tows of Bannockburn, Avoca and Winchelsea that were approved as a part of Victorian government initiative to support reticulated gas network within regional areas.

Design and construction of two new City Gates (i.e. Lovely Banks and Parwan) is underway with anticipated commissioning in 2021 & 2023 respectively. Two additional City Gates are planned for the 2024-28 regulatory period at Cragieburn and Werribee.

4.3.2. City Gate – Regulators

Figures 11 and 12 below show the age profile associated with the operational City Gate regulators within AusNet gas network:

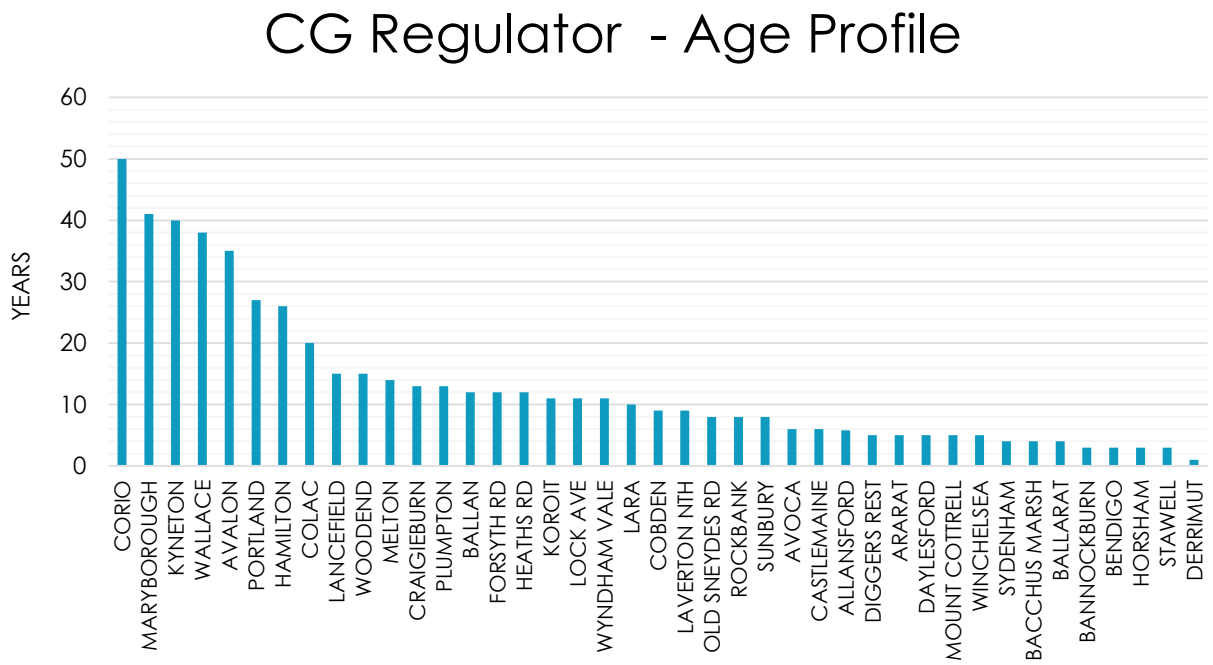


Figure 11 – City Gate Regulator Age Profile

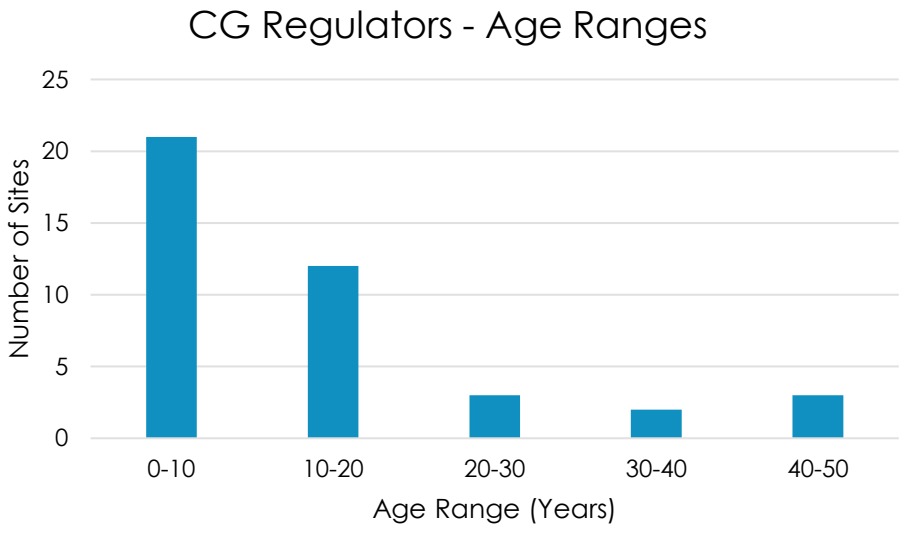


Figure 12 – City Gate Regulator Age Ranges

Prudent investment in asset renewals since 2018 has resulted in the replacement of ageing City Gate regulators. As a result, the majority of the CG regulators are well within the normal operating life. Regulators at 5 sites are over 35 years of age and are approaching end of useful life.

4.3.3. City Gate – Heaters

There are currently 39 gas heaters in operation at various City Gate sites with exception to Ballan and Wallace City Gates. A project is underway to install a new heater at Ballan City gate, with anticipated commissioning in 2022. At this stage, Wallace City Gate does not require a new heater due to small network size.

The majority of the heaters at AusNet services City Gate sites are quite new and well within the useful operating life. Figure 13 below shows the age profile of heaters at AusNet Services City Gate locations.

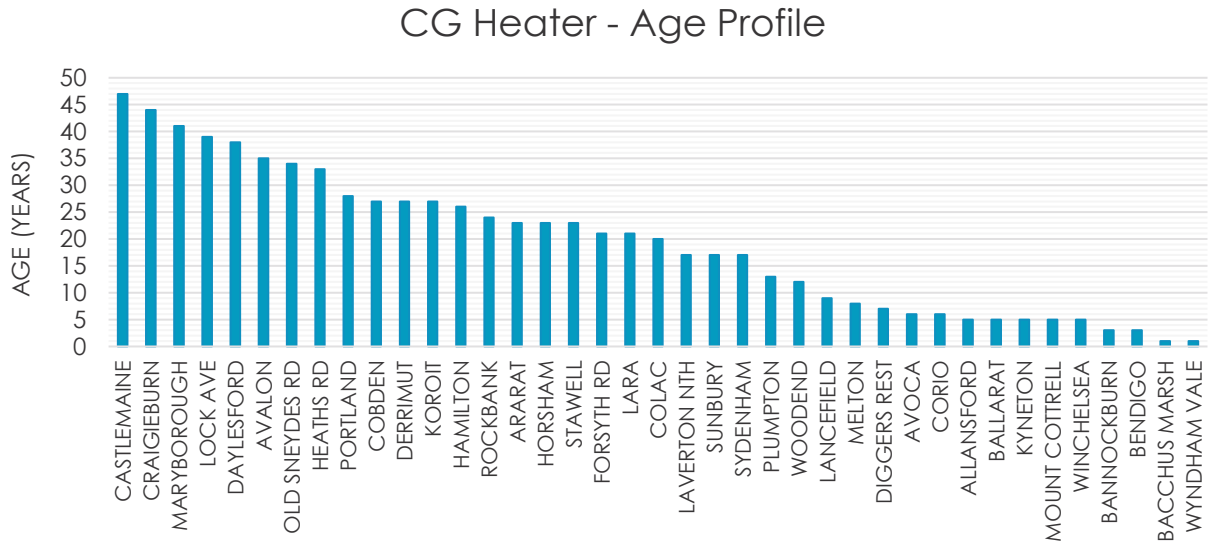


Figure 13 – City Gate Heater Age Profile

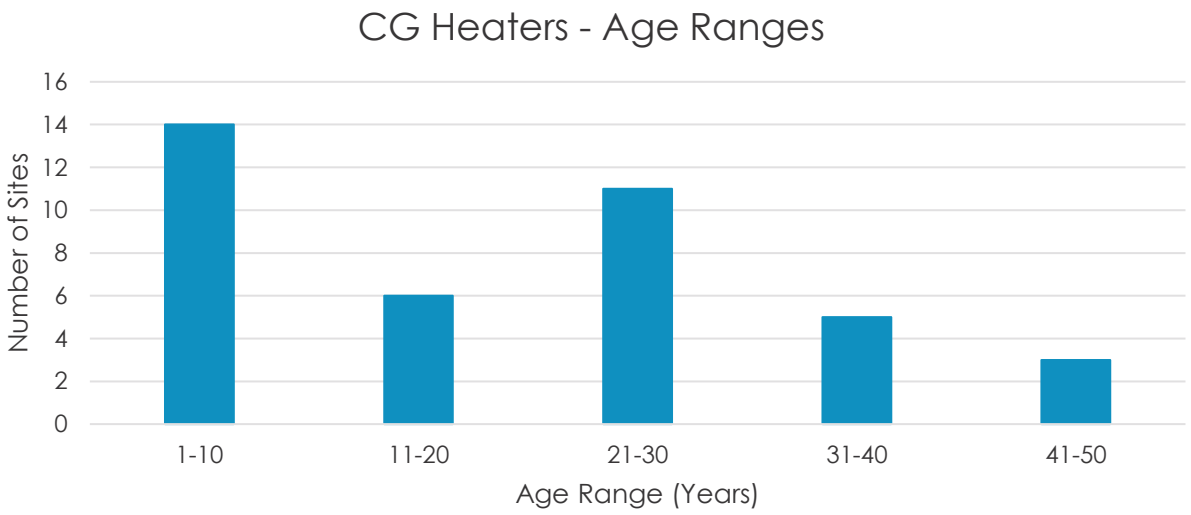


Figure 14 – City Gate Heater Age Ranges

Heaters at 6 City Gate sites are over 35 years in operation and are approaching end of useful life.

4.3.4. Field Regulators (FR)

There are currently 107 operational Field Regulators within AusNet Services Gas Distribution network. Field Regulators play a vital role in lowering the pressures prior to injection in the AusNet Services distribution network. Figure 15 below shows age profile of operational Field Regulators within AusNet Services Gas Network.

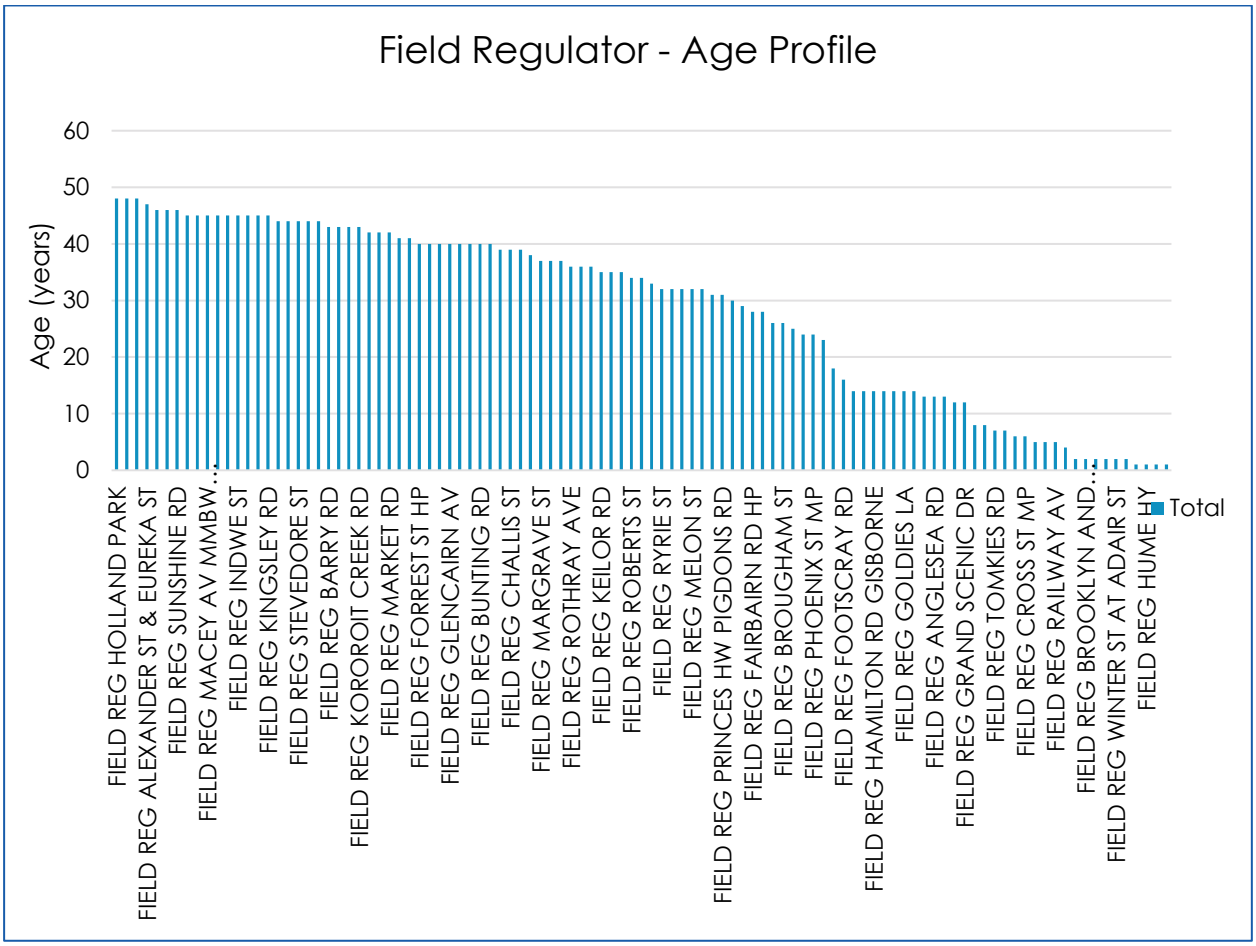


Figure 15 – Field Regulator Age Profile

A considerable portion of the fleet consists of regulators which are over 40 years in operation. The majority of these ageing regulator sites consist of Grove regulators which have known reliability and supportability issues. There is a higher trend in regulator faults which is attributed to the age and reliability issues as highlighted in Section 4.3.

4.3.5. District Regulators (DR)

AusNet Services' gas network contains 42 operational District Regulators. The demand for District Regulators is on decline as the network is renewed to High Pressure (HP) standard through the Mains Replacement Program (MRP).

Figure 16 below shows the age profile of operational District Regulators within AusNet Services Gas Network:

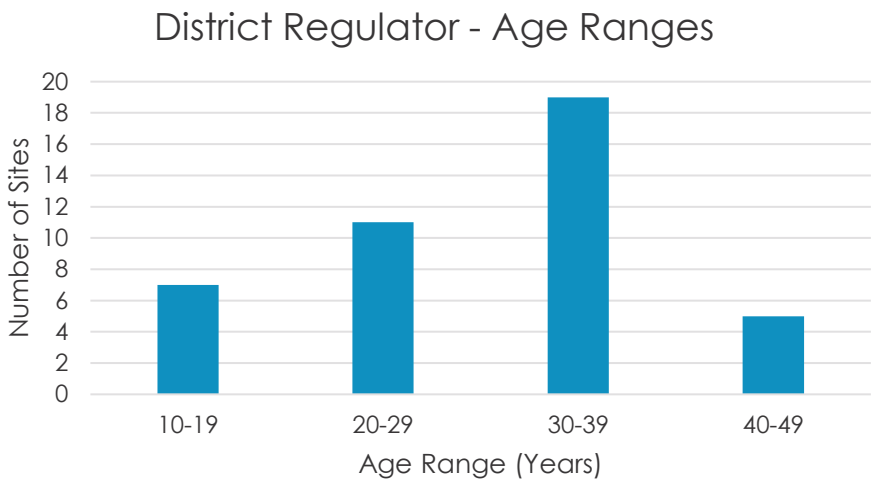


Figure 16 – District Regulator Age Ranges

The majority of the regulators are well within their normal working life. At this stage, a replacement program for District Regulators is not required, predominantly due to the LP network being upgraded to HP. The regulators will be maintained as per the current maintenance strategy; any replacement will be on an as needed basis in an event of severe deterioration or failure.

4.4. Asset Performance

4.4.1. Regulator Performance – CG, FR & DR

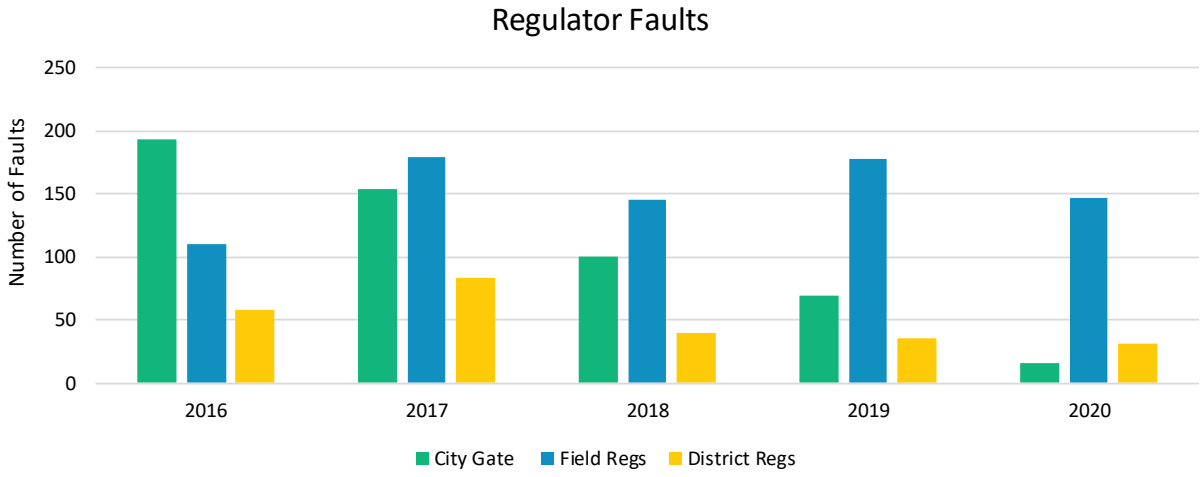


Figure 17 – Regulator Performance – CG, FR & DR

Figure 17 above shows the overall fault trend associated with CG, FR and DR asset class. Faults associated with an asset class could be a result of issues arising due to age, reliability, performance or environmental issues.

Overall, there has been a steady decline in the number of faults associated in the City Gate regulators. This is predominantly due to the proactive replacement of ageing and non-performing assets. The common City Gate failures are associated with the [C.I.C] type regulators, which are attributed to leaking of hydraulic fluid, inability to hold a set pressure and even full component breakdown. A proactive replacement program for [C.I.C] regulators was introduced in the current access arrangement period, prioritising the high fault frequency sites, which has led to a significant decrease in the

number of City Gate Regulator faults. There are currently 8 remaining City Gates with [C.I.C] regulators.

The rate of faults associated with Field Regulators has been quite stable over the last five years. However, given the criticality of these assets in regulating pressure within the distribution network, it would be greatly beneficial to improve performance and thus reduce the risk. The most common breakdown associated with the Field Regulators is flooding of the underground pits. This does not create any operational issues with the Field Regulator however it can result in damage to the assets including corrosion to the Field Regulator pipe work and shorting of the electrical components including SCADA monitoring and control equipment. There are 37 operational Field Regulators with ageing [C.I.C] regulators which are known for performance issues.

The number of issues related to District Regulators has reduced over the last five years and the rate is quite stable. The major cause of district regulator faults is water related. The Mains Replacement Program is targeting areas where water ingress is evident in the low pressure mains. This will reduce the occurrence of these issues. Also, as the majority of the network gets upgraded to HP, the number of DR's in the network will gradually reduce.

4.4.2. Heater Performance

The heaters perform a critical function at City Gate stations by preventing temperature related breakdowns which occur when gas temperatures fall below 0°C.

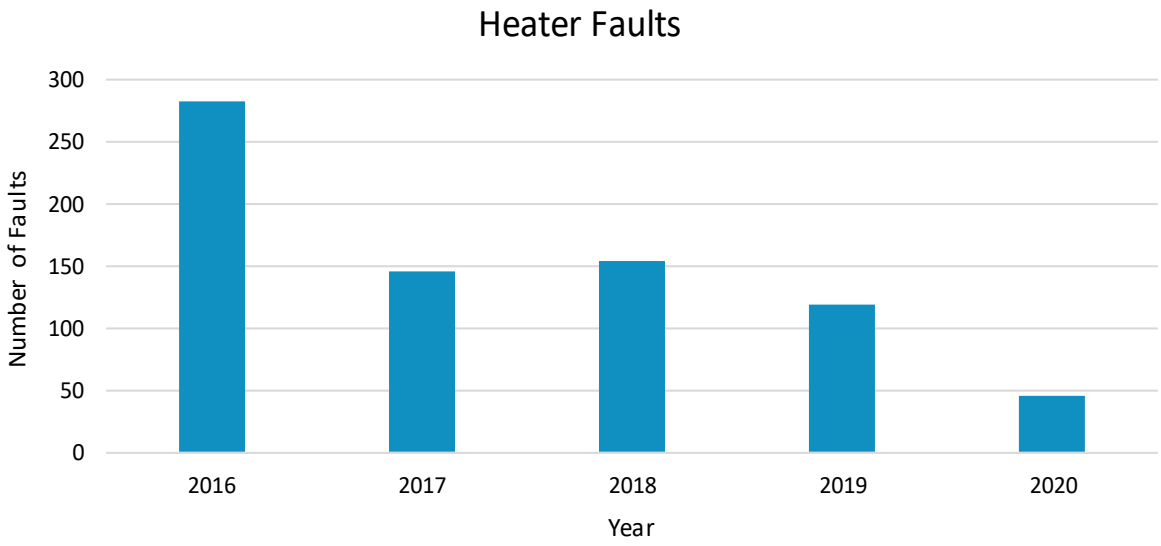


Figure 18 – City Gate Heater Performance

There is a substantial reduction in heater faults over last few years. This is predominantly attributed to replacement of non-performing heaters assets and introduction of new service requirement for heater maintenance. Over last two access arrangement periods heaters have been replaced at Kyneton, Allansford, Bacchus Marsh and Wyndham Vale City Gates sites. This has contributed to a reduction in the number of breakdowns associated with the heater asset class.

In addition, AusNet Services introduced new servicing requirements for each heater to be completed by a Type B appliance technician to meet the requirements of AS 3814 (Industrial and Commercial Gas Fired Appliances). This service is completed every 12 months and replaces one of the 6 monthly heater operational checks. During this service the combustion analysis of the burner and heater is analysed and adjusted as necessary. Appropriate operation of the flue and provision of adequate air supply to the burner is also checked and assured. As a result, a significant reduction in faults has occurred.

While the above has assisted in reducing ad hoc faults within the heater asset class, there are still sites with ageing heater assets which have approached the end of useful life. Spares for these heaters are unavailable and with an increased time to repair, a component failure could result in significant disruption to the network supply.

5. Risk

5.1. [C.I.C] Regulator Replacement Program

This program was initiated and approved for the current regulatory period due to the strong trend in the number of breakdowns associated with these types of regulators. Since then, AusNet Services has proactively targeted sites with [C.I.C] regulators and high failure rates.

The majority of the faults are related to leaking hydraulic fluid which is the operating medium in these types of regulators. Should the leak be large enough or left unattended for extended period of time the pressure within the hydraulic circuit of the regulator will drop. This drop in hydraulic pressure compromises the regulator's ability to reduce the pressure of the gas stream, resulting in regulator failure and the potential for over pressure in the downstream pipelines.

Failures occurring at the "bung" where it breaks within the regulator are also typical. The bung is a rubber plug which inflates and deflates in line with inlet pressure and flow fluctuations to maintain the constant set outlet pressure. The bung is the working part of the regulator which is responsible for the pressure reduction process. The failure of the bung results in hydraulic pressure loss and renders the regulator unable to reduce the pressure of the gas stream.

Strategy

Continue the replacement of remaining [C.I.C] type regulators at identified sites. Sites are prioritised by their high occurrence of failures. Table 4 lists the remaining sites with [C.I.C] type Regulators within AusNet Network.

Table 4 – Remaining [C.I.C] Regulators

Site	Age
City Gate Regulator Corio	51
City Gate Regulator Wallace	38
City Gate Regulator Portland	28
City Gate Regulator Hamilton	26
Field Regulator Market Street	42

5.2. [C.I.C] Regulator Replacement Program

[C.I.C] regulators replacement was approved for the 2018-22 regulatory period due to non-availability of spare parts with the ageing [C.I.C] regulator asset class. Since the previous regulatory period AusNet Services has proactively replaced [C.I.C] regulators at CG & FR sites and intends to continue the program into the 2024-28 access arrangement period.

[C.I.C] regulators were installed as far back as the early 70's. As some of these sites are nearing the 50 year design life, reliability issues have arisen. Further to this, [C.I.C] regulators are now obsolete and no longer supported by the manufacturer for spare parts.

As the [C.I.C] type regulators are now obsolete, the following issues arise:

- Spare parts required to maintain these regulators are no longer readily available;
- Spare parts have a limited shelf life; and
- In the event of maintenance required due to an emergency, parts are not available to undertake necessary repairs.

Incidents at [C.I.C] regulator sites include failing to hold the required outlet pressure due to deterioration of the units, in particular the "sleeve", which maintains the pressure control. The impact of failure, should all levels of redundancy fail, could result in pressure 14 times greater than the maximum design pressure of the downstream system (for City Gate sites). This would result in major asset failures including that of distribution mains and services as well as residential meters and regulators. This would be a catastrophic situation with large amounts of uncontrolled gas being released and a high potential of injury to people and damage to property.

Subsequently failures require a maintenance crew to visit the site to re-adjust the regulator pressure setting resulting in additional OPEX costs. These failures are compounded by the issue with the procurement of spare parts which results in substandard components utilised in the regulator. This increases the likelihood of further regulator failures.

Strategy

Continue the [C.I.C] regulator replacement program at all identified City Gate and Field Regulator stations based upon age, failure rates and network risk. Table 5 below lists the [C.I.C] regulators proposed for replacement.

Table 5 – [C.I.C] Regulators **proposed for replacement**

Site	Age	Driver
City Gate Regulator Kyneton	40	Age >45
City Gate Regulator Avalon	35	High Ad Hoc failure rate
Field Regulator Holland Park	48	Age >45
Field Regulator Clarks Road	46	Age >45
Field Regulator Sunshine Road	46	Age >45
Field Regulator Richards Street & Eureka Street	46	Age >45
Field Regulator Rosamond Road	45	Age >45
Field Regulator Bruce Street	45	Age >45
Field Regulator Macey Avenue	45	Age >45
Field Regulator Kingsley Road	45	Age >45
Field Regulator Tennyson Street	45	Age >45
Field Regulator Kororoit Creek Road	43	High Ad Hoc failure rate
Field Regulator Market Street	42	High Ad Hoc failure rate
Field Regulator Raleigh Street	39	High Ad Hoc failure rate

5.3. [C.I.C] Regulator Replacement

The [C.I.C] type regulators were introduced initially at Allansford City Gate in 2013 and then at Ararat, Stawell and Horsham City Gates in 2014. These regulators were installed to replace

[C.I.C] type regulators. The [C.I.C] type regulator was selected for these sites as it appeared to offer superior operability and maintainability over the [C.I.C] type regulators that had been the regular choice.

After 6 years of operation, it has been identified that this model of regulator regularly fails to engage the monitor regulator upon a fault on the working regulator under the operating conditions at these City Gate sites. After consulting with the regulator manufacturer and trialling a number of potential solutions, it has been concluded that these regulators are not suitable for operation at these sites due to the large fluctuations between minimum and maximum flow rates as well as the fluctuations in inlet pressure.

Given the risk this poses to the over pressure protection systems of these sites, AusNet Services intends to replace the regulators with [C.I.C] regulators. [C.I.C] are already in operation at the majority of the City Gate sites, have proven to be more reliable and can adequately handle pressure fluctuations. The following sites have the [C.I.C] Regulators:

- Ararat
- Horsham
- Stawell
- Allansford

Strategy:

Replace the regulators at these sites with [C.I.C] regulators to mitigate the network safety risk. The Ararat City Gate regulator is scheduled for replacement during the current regulatory period. Therefore, it is proposed to replace 3 Apperflux Regulators during the 2024-28 access arrangement period.

5.4. Heater Replacement

Heaters at 6 City Gate sites are over 35 years in operation and are approaching end of useful life. The heater at the Craigieburn City Gate is over 40 years old but supports only one I&C customer. The future of this site is uncertain so it would not be prudent to undertake large investment at the cost of other customers in the network. Therefore, the recommendation for this site is to maintain only. AusNet maintains sufficient spares in addition to routine maintenance to ensure reliable continuity of operation at this site.

The heaters at the remaining 5 city gate sites support both residential and industrial customers and are recommended for replacement. The majority of these heaters are also experiencing spare parts availability issues.

Table 6 – Ageing City Gate Heaters

City Gate	Age	Heater Type
City Gate Heater Castlemaine	47	Heat Exchanger
City Gate Heater Maryborough	41	Water Bath
City Gate Heater Lock Avenue	39	Water Bath
City Gate Heater Daylesford	38	Water Bath
City Gate Heater Heath Road	36	Water Bath

Strategy:

Replace heaters at the 5 sites nominated in Table 6 above to mitigate the reliability risk. Continue to monitor the heater at Cragieburn City Gate.

5.5. [C.I.C] Actuators Replacement

Actuators are widely used within the gas reticulations to control the valve operation. Historically,

[C.I.C] actuators have been installed widely within the network. There are currently

[C.I.C] actuators within AusNet network. Figure 19 below shows the age profile of these series actuators currently in operation.

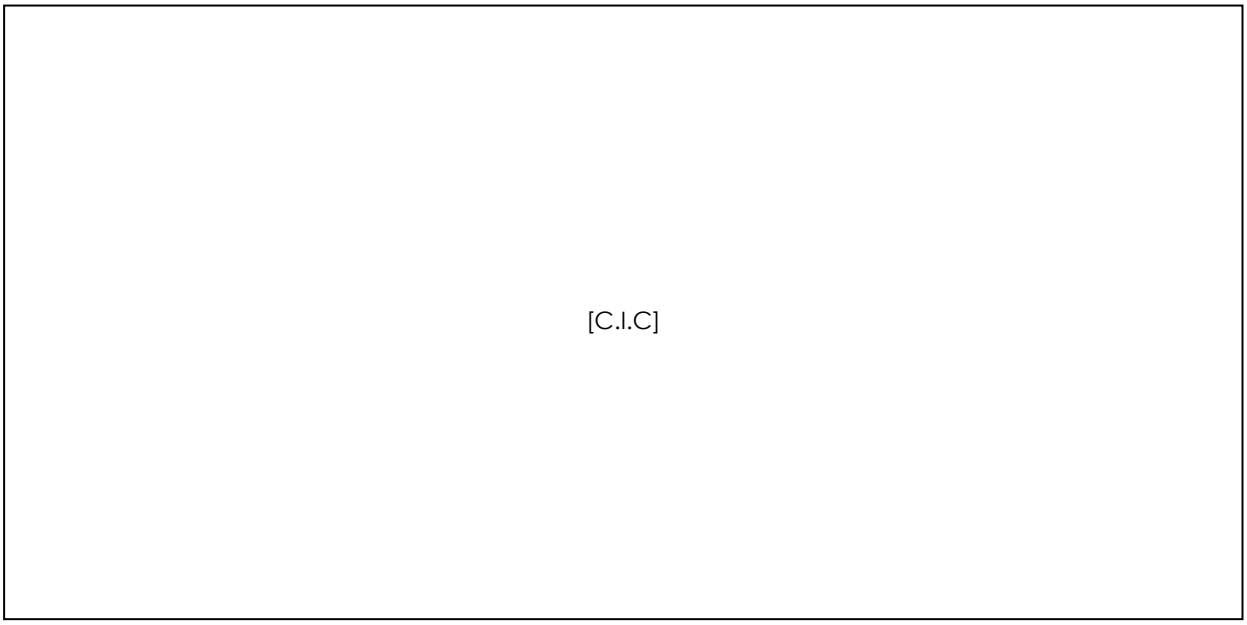


Figure 19 – [C.I.C] Sites

The majority of these actuators are over 40 years old and are past their useful operational life. In addition, the local supplier who supports these actuators has advised that spare parts are no longer available for these models. To mitigate the operational risk in an event of failure and non-availability of spares, AusNet Services proposes a proactive program to gradually replace ageing and un-supported [C.I.C] actuators. There is also a risk that the slam shut valves on these actuators will fail to close in a high outlet pressure incident. This risk is also mitigated by the proposed replacement program.

Strategy

Replace [C.I.C] actuators at the City Gate and Field Regulator sites listed in Table 7 & 8. These actuators will be replaced with [C.I.C] actuators which are widely used on AusNet Services network and well supported by local suppliers.

Table 7 – [C.I.C] Actuator Replacement Sites

Site	Age
FIELD REG MACEY AV	52
FIELD REG HUME HY	50
FIELD REG SUNSHINE RD	49
CITY GATE REG BENDIGO	48
CITY GATE REG BACCHUS MARSH	48
FIELD REG STEVEDORE ST	48
CITY GATE REG CRAIGIEBURN	47
CITY GATE REG BALLARAT	47
CITY GATE REG LOCK AVE	44
CITY GATE REG OLD SNEYDES RD	44
FIELD REG BALLARAT RD	42

Table 8 – [C.I.C] Actuator Replacement Sites

Site	Age
FIELD REG HOLLAND PARK	49
FIELD REG ARARAT AV	49
FIELD REG ALEXANDER ST & EUREKA ST	48
FIELD REG CLARKS RD	47
FIELD REG PHOENIX ST HP	47
FIELD REG COBURNS RD	47
FIELD REG RICHARDS ST & EUREKA ST	47
FIELD REG BRUCE ST	46
FIELD REG MACEY AV MMBW EASEMENT	46
FIELD REG HUME HY	46
FIELD REG SUNSHINE RD	46
FIELD REG EUREKA ST & QUEEN ST	45
FIELD REG KINGSLEY RD	45
FIELD REG STEVEDORE ST	45
FIELD REG KORORoit CREEK RD	44
FIELD REG SHARPS RD & MELROSE DR	44
FIELD REG RICHARDS & MITCHELL ST	44

5.6. Security Enhancement

5.6.1. City Gate – High Security Fence

High security fencing around the critical assets provides a measure to deter potential malicious activities which could have serious consequences for personnel, infrastructure and / or the community.

Over the past few years, security at City Gate sites has been identified as an issue through certain incidents which have occurred. These incidents involve the unauthorised access to City Gate facilities, damage to assets and theft. In one incident, solar panels were stolen from the City Gate, resulting in financial loss and disruption to SCADA communications and control until the solar power supply was replaced. This theft also caused significant damage to the security fencing and the potential risk of damaging high pressure pipework.

Introduction of Security Legislation Amendment (Critical Infrastructure) Bill 2020 by the Australian Government aims to ensure possible threats to Critical Infrastructure which deliver essential service (including gas) are reviewed and adequate safeguards are put in place to ensure safety from potential threats of vandalism.

In response to the above legislation, AusNet has undertaken a review of security provision at all City Gate sites. The review takes into consideration the site location, customer impact, existing fence type (i.e. ordinary chain wire mesh or high security fence) and Kiosk type (i.e. alarmed with a secure compound or in the open). Following the review 9 City Gates have been identified which pose an elevated risk to safety to AusNet Services' gas assets and community in an event of malicious activity. Table 9 lists the City Gates recommended for security fence upgrade.

Table 9 – Security Fence Upgrade Sites

[C.I.C]

These 9 sites currently have a basic perimeter fence which can easily be compromised with a handheld tool. In addition, these sites have no alarmed Kiosk. I.e. all critical equipment including regulators, pilots, slam shut, valves, SCADA equipment are installed in open space and can easily be assessed / vandalised in an event of site intrusion. Figure 20 below shows the typical setup of a chain wire mesh fence.

Figure 20 – Chain wire mesh fence

Strategy

To increase the level of security and prevent unauthorised access to the City Gate sites, it is recommended to replace the existing security fence at 9 sites with "anti-climb" fencing (Figure 21 below). This security fencing is significantly more effective at preventing intruders from climbing the fence and has been utilised by other Victorian gas distributors with good success.

Figure 21 – High security fencing

5.6.2. Closed Circuit Television (CCTV) Installation

CCTV provides an effective additional layer of defence to deter potential malicious activity. A review of criticality and safety of current City Gate infrastructure identified the need for security upgrade via CCTV's installation to deter and identify potential malicious activity in real time.

As a part of this review 4 City Gate sites have been identified for CCTV installation (Table 10 below). The identified City Gates are the single source of gas supply to major towns with Corio being the largest City Gate and a single source of gas supply to the entire Geelong, Bellarine, Torquay region.

These sites currently have a high security fence installed as a first line of defence. However, a disruption of gas supply due to vandalism at these sites could have severe consequence and potentially loss of gas supply to entire regions leaving large numbers of domestic and industrial customers without gas for prolonged periods.

Table 10 – CCTV Upgrade Sites

City Gate Site
[C.I.C]

Strategy

To further enhance the security of critical City Gates sites within AusNet gas network, it is recommended to install CCTV cameras with motion detection and backup battery life at 4 sites to deter and detect unauthorised access / activity in time.

6. Miscellaneous Works

This section covers scope for ad hoc works requiring replacement / upgrade of assets to ensure safety and reliability of gas infrastructure. The majority of these works are ad hoc in nature as identified due to equipment condition and safety issues identified during field / safety audits.

This includes works associated with upgrading Slam shut panels at identified sites to rated capacity, replacement of unsupported equipment / parts, filter replacements to allow downstream pressure measurement and other miscellaneous works as identified during the audits and inspections.

7. OPEX Overview

7.1. City Gates, Field Regulators and District Regulators

Operational Checks

This is scheduled maintenance carried out every **6 months** in accordance with Section 2 of AusNet Services' System Operations Manual.

Full Maintenance

Full maintenance is carried out on a **6 or 10 year** frequency with some sites on a breakdown only regime. The full maintenance frequency is assigned based on the criticality of the site within the network and failure history of the site.

Full maintenance entails all aspects of the operational check as well as replacing all of the soft spares within the regulator assemblies.

Breakdown Maintenance and Follow Up Work

Breakdown maintenance takes place whenever necessary whereas follow up work entails aspects which are identified during the routine maintenance as necessary to prevent breakdowns.

7.2. Heaters

Operational Checks

Operational checks are scheduled to take place at the same time as the City Gate operational checks and are to be conducted in accordance with Section 2 of the System Operations Manual.

Further to this, every alternate heater operational check is carried out by a Type B Appliance Technician. In addition to the above tasks, the following tasks are completed:

- Analysis of combustion gases is undertaken and assessed against the requirements of AS 3814.
- Undertake tuning of the combustion system to meet the requirements of AS 3814.

Full Maintenance

Heater full maintenance is also carried out at the same time as the City Gate full maintenance in accordance with the System Operations Manual. A heater full maintenance entails an overhaul (soft spare replacement) on all instruments on the gas train as well as control instruments where pneumatically controlled heaters are used.

A heater coil replacement is carried out when an inspection indicates that corrosion on the coil is greater than that of the criteria outlined in AS2885.1. This inspection is in addition to both heater operational check and heater full maintenance. Generally, heater coils are in good condition due to the maintenance of corrosion inhibitor levels in the water bath.

8. Detailed Works Plan

This section outlines the volumes and financial requirements associated with the Network Regulator Strategy for the 2024-28 regulatory period. 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 = 2022);
- Direct Expenditure only (i.e. excludes overheads and corporate finance costs); and
- In units of $1,000 (i.e. '000).

Table 11: Volume Summary

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

Table 12: Financial Summary

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

8.1. City Gate Regulator Replacement

Table 13 – City Gate Regulator Replacement

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

8.2. City Gate Heater Replacement

Table 14 – City Gate Heater Replacement

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

8.3. Field Regulator Replacement

Table 15 – Field Regulator Replacement

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

8.4. Actuator Replacement

Table 16 – [C.I.C] Actuator Replacement

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

Table 17 – [C.I.C] Actuator Replacement

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

8.5. Security Fencing Replacement

Table 18 – Security Fencing Replacement

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

8.6. CCTV Upgrade

Table 19 – CCTV Upgrade

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

8.7. Miscellaneous Works

Table 20 – Miscellaneous Works

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

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