Multinet Gas Networks

Attachment 9.15

Large Consumer Regulators Strategy

Final Plan 2023/24 – 2027/28

July 2022

Multinet Gas Networks

Large Consumer Regulators Strategy

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1. Executive summary

This document outlines the maintenance and replacement strategy for the large consumer regulators on the Multinet Gas Network (MGN). Large consumer regulators are defined as those supplying customers[1]:

- greater than 140 sm^3/h of natural gas off the low pressure system; or
- greater than 30 sm^3/h of natural gas off the high pressure or the medium pressure system, and at a metering pressure greater than 2.75 kPa.

MGN is required by the Victorian Gas Distribution System Code to provide and maintain an appropriate regulator and metering installation at each network supply point (i.e. connection). We also have obligations to ensure assets remain safe and security of supply is maintained under our Gas Safety Case and Australian Standard 4645 (AS/NZS 4645).

To ensure we continue to meet these obligations, it is essential that we make certain our large consumer regulators are in good condition, are fit for purpose, and operable. One of the challenges we face is that as time passes, manufacturers will change the design, functionality and level of support provided to their regulators. This means some pressure regulators may become obsolete and no longer fit for purpose. Obsolete regulator replacement is therefore one of our most critical programs of work and is central to our Large Consumer Regulator Strategy during the next access arrangement (AA) period (2023 to 2028).

1.1. Obsolete large consumer regulator replacement program

Obsolete regulator replacement is an ongoing program, established ten years ago, to replace regulators that are no longer supported by the manufacturer or have become non-compliant with contemporary standards/industry practices.

Our Victorian network has around 5,000 regulators installed across 3,500 sites. We have identified [redacted] installations that have, or will have, unsupported equipment or non-compliant factors. Where regulators have fallen out of manufacturer support, parts and technical service will no longer be available, placing the customers at risk of extended outages and disruption to gas supply if the regulators fail. Our aim to replace and/or upgrade any unsupported or non-compliant assets as soon as reasonably practicable.

We intend to replace [redacted] of these obsolete/non-compliant regulators during the next AA period, with the balance [redacted]) being replaced during the following AA period. This replacement rate is consistent with the current period, which will see approximately [redacted] regulators replaced.

We considered ramping up our replacement rate to address all [redacted] obsolete regulators during a single AA period. However, by retaining spare parts from the regulators we replace over the next five years, we believe we can mitigate the risk associated with the outstanding obsolete regulators and defer their replacement to the following AA period. This approach allows us to avoid the additional costs of ramping up resources, while managing the risk to as low as reasonably practicable (ALARP) in the interim.

[1] Customer installations fed directly from the High Pressure 2 (HP2) or Transmission pressure system are treated the same as Field Regulators. Refer Supply Regulator Strategy (MG-SP-0006).

Table 1-1 summarises the costs of the obsolete large consumer regulator program over the next AA period:

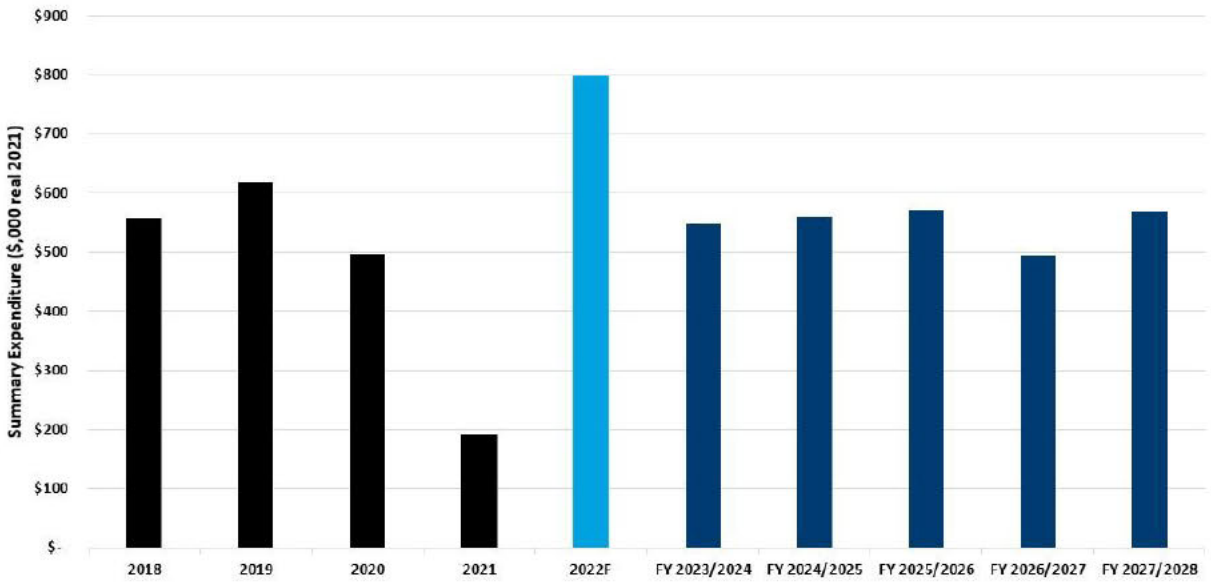
Table 1-1: Forecast obsolete regulator replacement program, $'000 real 2021

	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Number of sites	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total direct expenditure	**548**	**559**	**572**	**495**	**570**	**2,744**

Where possible, we conduct regulator replacement works at the same time as the regulator would have been due for a full maintenance overhaul (known as a 'full strip down'). This allows us to install the new parts and carry out associated maintenance works in one visit, while simultaneously building up a stock of spares for the remaining population of obsolete regulators. This promotes a more sustainable and cost-effective works program.

The order of replacement is prioritised by risk, with focus on those regulators that have shown performance issues and/or gas leaks. Expenditure on the proposed obsolete regulator replacement program is shown in Figure 1-1.

Figure 1-1 Historical and forecast obsolete regulator replacement program, $'000 real 2021



Annual forecast expenditure for the next AA period is consistent with that incurred during 2018 to 2020. Note that expenditure during 2021 was lower than in previous years due to supply chain difficulties experienced across Australia in the wake of the global pandemic. However, we expect the program to catch up to some extent during 2022.

The costs of replacing a large consumer regulator can vary depending on the size, location and type of regulator. Analysis of the [redacted] obsolete regulators due for replacement over the next five years indicates there will be more larger regulator replacements/complex projects undertaken than in prior periods. The cost estimates for the obsolete regulator replacement program over the next AA period are informed by costs previously incurred to replace regulators of comparable

size/complexity, with unit rates adjusted to reflect the higher cost of materials (steel, copper) and labour experienced in the current market.

1.2. Efficiency of the proposed solution

MGN considers replacing obsolete large consumer regulators is a prudent activity and that the proposed work program is the minimum required over the next AA period to efficiently manage the asset class. It is reasonable to expect that over time equipment becomes obsolete as manufacturers upgrade their products. We submit the proposed program is an efficient method of managing this risk and ensuring customers' metering equipment remains operable.

Alternative options to the proposed program were considered, including utilising regulators until failure, as well as an accelerated replacement program. However, MGN submits that maintaining the current rate of replacement reflects prudent asset management and makes the most efficient use of resources.

MGN considers the proposed obsolete large consumer regulator program satisfies the requirements of the following National Gas Rules:

- **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service.
- **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
- **NGR 74** – the forecast costs are based on historical expenditure and project options consider the asset management requirements as per the latest Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.

2. Document overview

2.1. Purpose

This document articulates MGN's approach to the management of its existing large consumer regulating assets and their associated components. It is one of several asset strategies developed and maintained for the management of MGN's gas distribution network.

This Large Consumer Regulator Strategy has the following objectives:

- identify the capital works program for 2023/24 to 2027/28;
- present cost estimates for the works program;
- provide justification and evidence that demonstrates the proposed program is prudent and efficient (as per requirements of NGR 79);
- demonstrate that the program cost and volume estimate have been arrived at on a reasonable basis (as per requirements of NGR 74); and
- provide a record of the proposed works program to help inform program delivery and asset management during the period.

The document is intended for use by:

- MGN staff (and its service providers); and
- Regulators – technical, safety and economic.

2.2. Scope

This strategy covers the management of MGN's existing large consumer regulating assets. It focuses on gas pressure regulating devices installed for supply to industrial and commercial (I&C) consumers. Also considered are the materials and plant used in the construction of large consumer regulator assemblies, excluding the meter.

Large consumer regulators are defined as regulators designed for supplying customers:

- greater than 140 sm^3/h of natural gas off the Low Pressure system; or
- greater than 30 sm^3/h of natural gas off the High Pressure or the Medium Pressure system and at a metering pressure greater than 2.75 kPa.

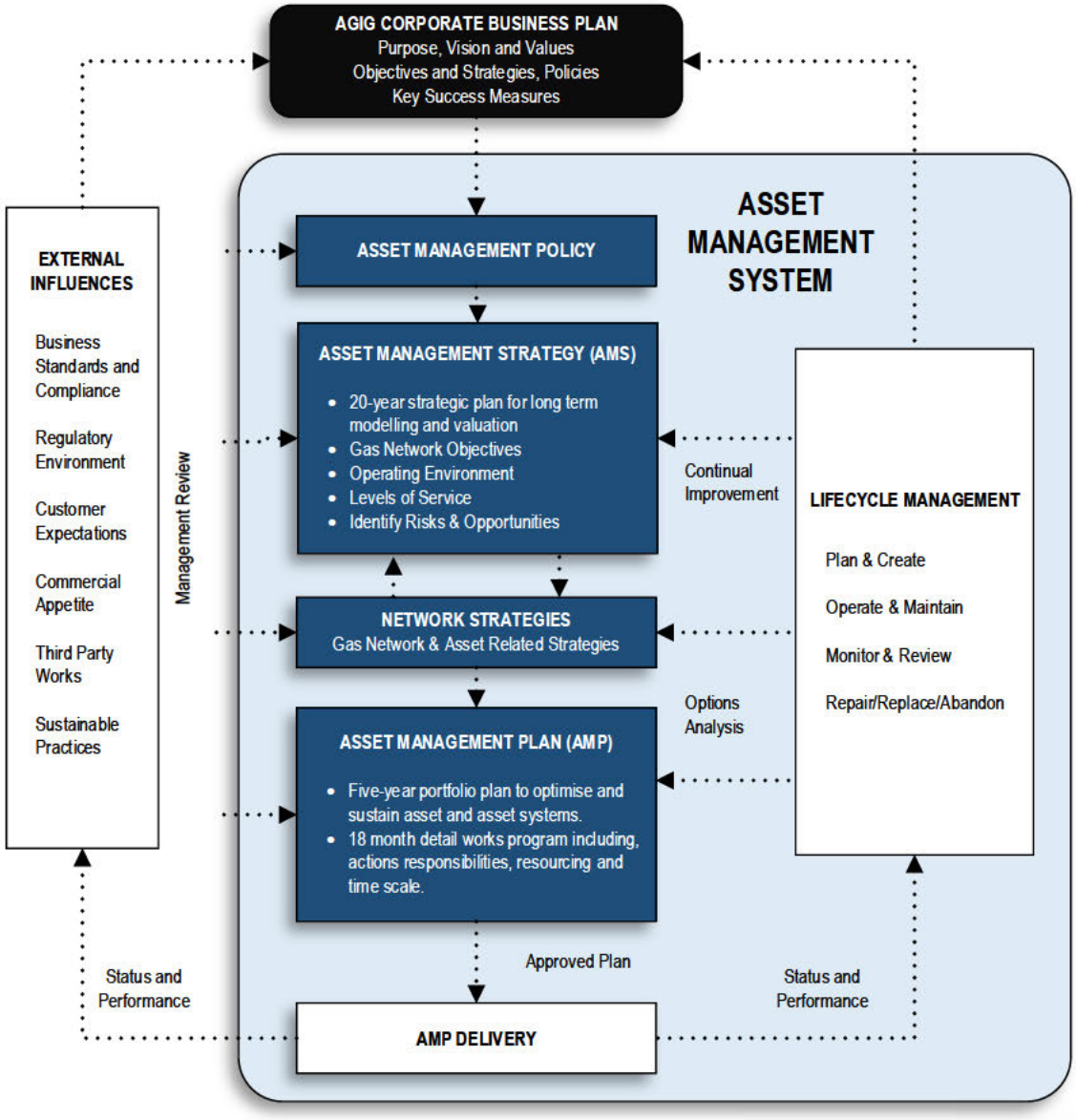
The strategy excludes:

- metering assets at each location – Refer Meter Strategy (MG-SP-0007); and
- small consumer regulators.

2.3. Relationship with other asset management documents

The Large Consumer Regulator Strategy is one of a number of key asset management related documents developed and published by MGN in relation to its gas network. As indicated in Figure 2-1 below, detailed network strategies – including the Large Consumer Regulator Strategy - informs both the Asset Management Strategy (AMS) and Asset Management Plan (AMP) of the required capital programs needed to achieve the long-term objectives of the gas distribution network.

Figure 2-1: Asset management framework



2.4. Financial figures used in this document

All financial figures quoted within this document - unless otherwise specifically stated - have the following characteristics:

- real unescalated expenditure / cost (reference year = June 2021);
- direct expenditure only (i.e. excludes overheads and finance costs);
- in units of $1,000 (i.e. ,000); and
- all years are denoted in financial year format (July to June), unless otherwise stated.

2.5. Data sources

The following data sources have been drawn on to develop the Large Consumer Regulators Strategy:

- SAP - the MGN primary asset management database used to store all equipment related data; and
- Tableau - uses an extract (duplicate) of the SAP database so reporting can be performed in real time without diminishing the available bandwidth of SAP for business-as-usual processes.

2.6. References

- Gas Safety Case;
- Gas Distribution System Code (Version 15);
- AS/NZS 4645 series - Gas Distribution Networks;
- MGN Risk Management Plan; and
- MGN - System Operations Manual.

3. Asset overview

3.1. Introduction

Large consumer regulators are installed across the breadth of the MGN network. We currently have ~5,000 regulators installed over ~3,500 sites, predominantly located in the southern industrial areas.

We have identified installations that have, or will have, unsupported equipment or non-compliant factors that require replacement and/or upgrade within the next five years. When an asset is no longer supported by the manufacturer, spares and technical support will no longer be available, which places the consumer at risk of extended outages if the regulator fails.

We have an ongoing replacement program, whereby we replace large consumer regulators when they become obsolete or reach the end of their technical life. Historically, we replace approximately [redacted] regulators per year.

This Large Consumer Regulator Strategy applies to assets located on the consumer's premises and are supplied from the MGN distribution network.

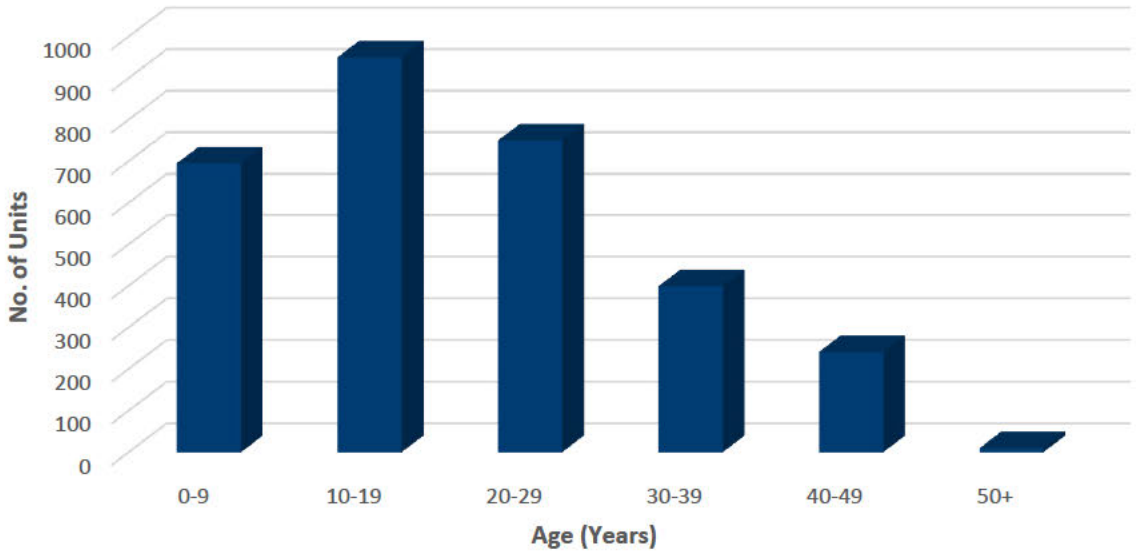
3.2. Age profile of sites

The large consumer regulator site age profile encompasses a broad time-span, with the older sites installed in the late 1960s. The majority of these sites were installed / constructed by the former Gas and Fuel Corporation.

Approximately 23% of all current large consumers have connected within the last ten years. The average age across all large consumer connection sites is 19.5 years.

The age profile for MGN's large consumer regulator sites is provided in Figure 3-1. Refer to Appendix B.1 for a list of regulators installed each year since 1969.

Figure 3-1: Asset age profile for large consumer regulators sites



3.3. Asset performance

The condition of large consumer regulator installations is predominantly good. This is due to regular maintenance practices that enable us to proactively address most minor issues prior to risk escalation. The maintenance strategy for these assets encompasses both functional checks and full strip downs. Full strip downs are conducted every 12 years of asset operation and comprises a comprehensive overhaul of the regulator and associated assets (cleaning, painting, check valves, replace gaskets and corroded parts, etc.). This maintenance approach has proven to be an excellent strategy to maximise the asset life of the regulators that we have in the portfolio.

Despite the ongoing maintenance program, asset age remains a factor. Older installations (30+ years) periodically require repair and/or re-coating, particularly those containing lead. Also, some installations installed during the early 1980s are suffering from component corrosion due to age and material quality. Corrosion and coating issues are rectified as part of full strip down maintenance activities as and when they occur and may result in maintenance being prudently brought forward to avoid asset failure.

Generally, our preference is to use this maintenance and strip down schedule to extend the life of the regulator assets where safe to do so. However, the ability to fully service and strip down the large consumer regulators is impacted by the availability of parts and support.

As manufacturers develop their products, they will periodically cease to produce parts or offer technical support for older products, particularly those that have been superseded. This means the spare parts required to conduct asset overhauls can be difficult to source.

When an asset is due for a strip down, one of the key considerations is whether the regulator is still supported and a supply of spares is available. Where parts and support are available, we will conduct the full strip down as planned. Where the manufacturer has ceased support or has indicated it will cease support in the near future, we may opt to replace the obsolete regulator to ensure a sustainable approach to lifecycle management.

Other factors can influence whether a regulator is replaced rather than overhauled. For example, changes in industry practice or technical standards such as installation of over pressure shut of devices may necessitate a new regulator where there are currently no such controls in place.

Obsolete and/or non-compliant regulators that are targeted for replacement are discussed in the following section. Refer to Appendix B.2 for a list of regulators by type and quantity installed.

3.3.1. Obsolete regulator replacement – original equipment manufacturer

When regulators require replacement, a review is conducted of the existing infrastructure to ensure an appropriate replacement regulator is installed. Where possible we install the same style and family of regulators that are performing well. This allows us to standardise the asset class over time and yield maintenance savings in future periods, while reducing the risk of spares unavailability. Consideration is also given to the future network requirements and whether regulators are renewable gas ready. Hydrogen readiness is further discussed in Section 4.5 below.

Dival regulators – [redacted] units to be replaced

The Dival 100 family (LBP, LTR and LMP), Dival 250-LBP and Dival 250-LTR models are experiencing issues with availability of spare parts. The Dival direct actuating regulator has been installed on new connections for at least 20 years. Early models have had lock up issues, however it is not yet determined up to which year or model modification this is isolated to.

We intend to replace the Dival 100 family of regulators with [redacted] regulators as and when the scheduled overhaul maintenance package of these units is due (QCH activity type in SAP).

The Dival family of regulators are currently on an 18-month operational check and a 12-yearly full strip down maintenance schedule.

Rockwell 243 regulators - [redacted] units to be replaced

The Rockwell 243 RPC regulators have been installed on the gas network since 1989. These regulators are no longer supported by the original equipment manufacturer and the availability of spare parts is now limited. We therefore plan to replace these regulators in the next AA period.

Grove regulators - [redacted] units to be replaced

There is a small population of Grove regulators (8), which are installed in I&C metering facilities. Spare parts for the Grove model 80 and 81 are not readily available and are expensive to procure. We plan to replace the Grove family of regulators with suitable sized [redacted] or [redacted] regulators, with both being proven regulator models on our network.

Fisher 298 regulators – [redacted] units in next 5 years

Production of the Fisher 298 regulator model ceased many years ago and getting spare parts has been difficult. The current lead time on orders exceeds 12 weeks and manufacturers are not providing assurances regarding spare part availability over the next 5–10 years. This posed a risk of supply interruption to the customer in the event of a regulator breakdown as the spare parts to repair the regulator were not readily available.

However, recent discussions with the supplier of Fisher products have revealed that Fisher Valve division still manufacture the components needed for a soft spares kit, as these components are used by other products in their valves division. We plan to engage with the Fisher Valves division to procure the soft spares kit by collecting the components needed for our fleet of Fisher 298 (T-EG, T-TK and T-EK) I&C regulators. Hence, going forward, the Fisher 298 regulators will be excluded from the obsolete regulator replacement program. In the event of a breakdown of a Fisher 298 regulator, it is planned to be replaced with [redacted] regulators.

Fisher 99-41 regulators – [redacted] units to be replaced

Production of the Fisher 99-41 regulator model has also ceased and getting spare parts for this model has been difficult. The current lead time on orders exceeds 12 weeks and manufacturers are not providing assurances regarding spare parts availability over the next 5–10 years. This poses a risk of supply interruption to the customer in the event of a regulator breakdown as the spare parts to repair the regulator are not readily available. Hence, these regulators are planned to be replaced with suitable [redacted] regulators over the next 5 -10 years as and when they are due for maintenance.

Donkin 226 Regulators – [redacted] units to be replaced

Donkin regulators have three distinct models, or families depending upon the regulator size. Spare parts for the earlier models, or families are no longer available, and as such we have been replacing these regulators with a suitable regulator with spare parts support available. [redacted] is a drop-in replacement but suitable replacements are not limited to the [redacted] family.

3.3.2. Obsolete regulator replacement – upgrade to industry standard

Over pressure shut off (OPSO) protection is now considered standard industry practice in the protection of customers assets. OPSOs help ensure pressure excursions don't impact or damage customers' processes or equipment. The following regulators are flagged as requiring replacement with regulators with OPSOs.

Reliance 2002M regulators – [redacted] to be replaced

The over pressure protection for the sites installed with a Reliance 2002M model is a pressure relief valve. This is not deemed to be a satisfactory method of over pressure protection as per current industry standards. These regulators are planned to be replaced with suitable [redacted] regulators over the next 5-10 years as and when they are due for maintenance.

Reliance 1813B Regulators – [redacted] to be replaced

These regulator models do not have an OPSO fitted on them and hence have been included as part of the replacement program. These will be replaced with a suitably sized [redacted] regulator.

Reliance 3000 & 3010 Regulators - [redacted] units to be replaced

Reliance regulators have not been deemed end of life, however changes in supply integrity, best business practices (traditionally having relief valves as the only over pressure protection (OPP)) and community expectations (greenhouse emissions) have prompted the upgrade or certain Reliance regulator families. This program sees the upgrade of Reliance 3000 & 3010s with [redacted] with suitable OPP measures in place.

4. Asset management drivers

4.1. Network vision

The MGN vision informs the way we manage and invest in our assets.

Figure 4-1: Network vision and objectives

4.1.1. Delivering for customers

Our aim is to continue to deliver customers the service they want and value. This includes keeping people safe from harm, maintaining a reliable gas supply, and providing quality customer service.

The MGN gas distribution network is located in densely populated areas. This means we have a duty of care to make certain our assets are functioning properly, and that we can detect and prevent any potential safety issues.

This Large Consumer Regulator strategy aims to achieve a high level of customer satisfaction and service by providing a reliable means of gas supply to I&C customers. Central to this is ensuring the large consumer regulators remain operable and can be maintained/repaired without impacting customer supply any more than is absolutely necessary. We also have a responsibility to make sure the meter rooms at customers' premises are safe and compliant.

4.1.2. A good employer

We strive to be a leader in health and safety by ensuring employees and contractors are mindful of the factors affecting their physical and mental health. This is done through strict health and safety procedures, incentive programs and regular workshops and health screenings.

Wherever practicable and prudent to do so, we aim to apply technologies such as telemetry and remote monitoring, which helps limit our employees' and contractors' exposure to manual and sometimes hazardous network management activities. We also focus on maintaining asset integrity, reducing the risk of leaks and/or failure which carry the potential for harm.

We aim to ensure high employee engagement by keeping employees up to date with relevant town halls and workshops of the entire business. Skills development is also a focus, ensuring both contractors and employees have the relevant skills and requirements for performing their roles.

4.1.3. Sustainably cost efficient

We aim to be sustainably cost efficient, working within benchmarks while still providing benefits to the customer and to shareholders. We intend to ensure natural gas remains a competitive, value-for-money fuel option in line with customer interests and expectations.

The maintenance and replacement strategies outlined in this document are aimed at improving the efficiency of the MGN network – providing the lowest cost of service to network users. We aim to deliver these programs for the lowest practicably sustainable cost and consider a range of options before committing to a course of action.

We are also mindful of our environmental and social responsibilities and will test our asset management strategies and work practices against relevant environmental, sustainability and societal obligations.

The obsolete regulator replacement program targets certain regulators (e.g., Dival 250s, 100s, Rockwell 243 RPA/RPC etc.) and aims to replace them with suitable newer models for which parts are adequately supported by the manufacturer. This program will ensure that the older model regulators are being replaced in a cost-efficient manner and will build a suitable level of strategic spares that can be used in the event of any breakdown of a similar model on the network. The timing of replacement of these regulators is planned to coincide with the dates of their planned strip-down maintenance to ensure that these regulators are replaced in the most cost-efficient manner.

4.2. Network objectives

We manage the network in line with six asset objectives, which are linked to the AGIG vision and underpin our asset management practices. Achieving these network objectives enables us to provide good customer service, remain a good employer and be sustainably cost efficient.

Table 4-1: Summary of MGN network objectives

Operate and invest in assets to keep the public and MGN's employees safe	MGN will achieve this by: • Investing in and operating the network in line with the Gas Safety Case, zero harm principle and all laws and relevant industry standards; • Managing known risks to as low as reasonably practicable (ALARP); and • Meeting emergency response Key Performance Indicators (KPIs) (call centre, high priority leaks).
Maintain continuity of supply to MGN's customers	MGN will achieve this by: • Meeting network availability KPIs; • Maintaining operating pressures through monitoring and augmenting MGN's network; and • Addressing leaks in line with MGN's leak management plan.

Improve MGN's customers' service experience in line with their expectations	MGN will do this by: • Maintaining accuracy of metering assets within relevant industry standards; • Delivering valued services to customers at the lowest sustainable price; and • Meeting customer KPIs (reliability/outages, safety, complaints, and overall customer satisfaction).
Balance network performance and costs to deliver affordable services	MGN will do this by: • Optimising overall asset lifecycle management costs; • Maintaining operating efficiency without compromising safety and reliability; • Developing investment plans that consider stakeholder expectations; and • Leveraging people, data and technology to deliver continuous improvement.
Promote gas usage to ensure the networks remain sustainable	MGN will achieve this by: • Connecting new greenfield expansion projects in a timely manner; • Enabling new urban infill connections; • Engaging with key stakeholders to develop adequate network solutions for future supply options; • Increasing long term competitiveness of networks through higher asset utilisation; and • Promoting use of gas.
Embrace innovation and work towards net-zero emissions	MGN will achieve this by: • Considering alternative innovative, sustainable and/or lower long-term cost solutions; • Pursuing research and development opportunities where they facilitate us to meet MGN's vision and objectives; and • Supporting the decarbonisation of MGN's gas supplies and the move to smarter gas networks.

4.2.1. Technical obligations

This strategy aims to achieve a high level of technical compliance by ensuring that all maintenance and replacement activities are carried out to meet the requirements of

- MGN Safety Case
- AS/NZS 4645 series - Gas Distribution Networks
- AS/NZS 2885 series – Gas and Liquid Petroleum
- Victorian Gas Distribution System Code (Version 15).

4.2.2. Consistency with the National Gas Objective and the National Gas Rules

In developing these forecasts, we have had regard to the National Gas Objective (NGO) and Rule 79/91 and Rule 74 of the National Gas Rules (NGR). With regard to all projects, and as a prudent

asset manager/network business, we give careful consideration to whether capex is conforming from a number of perspectives before committing to capital investment.

National Gas Objective

This strategy furthers the NGO by promoting efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

National Gas Rules

MGN considers the proposed obsolete large consumer regulator program satisfies the requirements of the following National Gas Rules:

- **NGR 79(1)** – the proposed solution is consistent with good industry practice, several practicable options have been considered, and market rates have been tested to achieve the lowest sustainable cost of providing this service.
- **NGR 79(2)** – proposed capex is justifiable under NGR 79(2)(c)(ii), as it is necessary to maintain the integrity of services.
- **NGR 74** – the forecast costs are based on historical expenditure and project options consider the asset management requirements as per the latest Asset Management Strategy. The estimate has therefore been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.

4.3. Risk Management

Risk management is a constant cycle of identification, analysis, treatment, monitoring, reporting and then back to identification (as illustrated in Figure 4-2). When considering risk and determining the appropriate mitigation activities, MGN seek to balance the risk outcome with our delivery capabilities and cost implications. Consistent with stakeholder expectations, safety and reliability of supply are our highest priorities.

Our risk assessment approach focuses on understanding the potential severity of failure events associated with each asset and the likelihood that the event will occur. Based on these two key inputs, the risk assessment and derived risk rating then guides the actions required to reduce or manage the risk to an acceptable level.

Figure 4-2: Risk management principles

MGN's risk management framework is based on:

- AS/NZS ISO 31000 Risk Management – Principles and Guidelines;
- AS 2885 Pipelines-Gas and Liquid Petroleum; and
- AS/NZS 4645 Gas Distribution Network Management.

The Gas Act 1997 and Gas Regulations 2012, through their incorporation of AS/NZS 4645 and the Work Health and Safety Act 2012, place a regulatory obligation and requirement on MGN to reduce risks rated high or extreme to low or negligible as soon as possible (immediately if extreme). If it is not possible to reduce the risk to low or negligible, then we must reduce the risk to as low as reasonably practicable (ALARP).

When assessing risk for the purpose of investment decisions, rather than analysing all conceivable risks associated with an asset, MGN look at credible, primary risk events to test the level of investment required. Where a credible risk event has an overall risk rating of intermediate or higher, we will undertake investment to reduce the risk.

Six consequence categories are considered for each type of risk:

1. **People** – injuries or illness of a temporary or permanent nature, or death, to employees and contractors or members of the public
2. **Supply –** disruption in the daily operations and/or the provision of services/supply, impacting customers
3. **Environment** (including heritage) – impact on the surroundings in which the asset operates, including natural, built and Aboriginal cultural heritage, soil, water, vegetation, fauna, air and their interrelationships
4. **Reputation** – impact on stakeholders' opinion of MGN, including personnel, customers, investors, security holders, regulators and the community
5. **Financial** – financial impact on MGN, measured on a cumulative basis
6. **Compliance** – the impact from non-compliance with operating licences, legal, regulatory, contractual obligations, debt financing covenants or reporting / disclosure requirements

Note that risk is not the sole determinant of what investment is required. Many other factors such as growth, cost, efficiency, sustainability and the future of the network are also considered when we develop engineering solutions. The risk management framework provides a valuable tool to

manage our assets, and prioritise our works program, however it is not designed to provide a binary (yes/no) trigger for investment. As prudent asset managers, we apply our experience and discretion to manage and invest in our distribution networks in the best interests of existing and potential customers.

4.4. Lifecycle management

Lifecycle management is broken up into four key components. These are described below.

4.4.1. Plan and create

Planning and creation considers current and future customer growth and load demands, asset performance and service needs, and secures the necessary approvals for expenditure. Project creation is driven by customer requests for gas, and as customers in the Large Customer Regulator categories typically require larger volumes of gas, project considerations may include the creation of new assets to:

- extend the network;
- provide new network, metering and SCADA facilities; and
- augment existing assets as capacity limitations are reached due to a customer requiring an increased peak flow, or volume, of gas.

4.4.2. Operate and maintain

Operation and maintenance involves two principal sub-processes:

Inspection and preventative maintenance

Maintenance frequencies are dependent on the type of site, operational and regulatory requirements.

Inspection and preventive maintenance activities are undertaken on either an:

- 18-month operational check / 144 month (12 years) full strip down maintenance schedule (SAP Strategy Reference: MR0002); or
- 36-month operational check / 144 month (12 years) full strip down maintenance schedule (SAP Strategy Reference: MR0003).

Continuous improvement in reliability centred maintenance strategies

The full strip down maintenance schedule for pilot operated regulators (e.g., Dival regulators) was extended from 10.5 years to 12 years in 2017 following a review of existing maintenance frequencies and a risk assessment.

Preventive maintenance on 25mm Reliance 1800 series (except 1813B) single run regulators operating at 4 kPa and 7 kPa was ceased since 2017 following a review of existing maintenance frequencies and a risk assessment. These regulators were previously on a maintenance schedule of 36 monthly inspection and 12 yearly full strip down maintenance. Currently, the same regulator is used on domestic premises with no preventative maintenance activities.

Previous Reliability Centered Maintenance (RCM) studies have allowed us to extend the strip down maintenance frequency from six years to 12 years based on the satisfactory performance of these assets and the extend the inspection frequency from 18 monthly to 36 monthly with no noticeable

increase in breakdown maintenance. This gives us the confidence to cease preventative maintenance on this family of regulators.

The maintenance activities undertaken since 1987 (developed by the former Gas and Fuel Corporation) were changed in 2000 to reflect more closely a risk-based maintenance program. In 2009, this was revised and the preventative maintenance frequency was extended to 36 month cycle with 12 year overhaul and an additional task list was created. This change had only applied to direct actuating regulators, with the exception of Dival regulators targeted for replacement due to obsolescence in Table 5-1.

For scheduled maintenance activity details refer to the MGN System Operations Manual and maintenance schedule review documents. Regulators being supplied by the low pressure network have a reduced maintenance frequency due the inherent reduced risk of lower pressures.

We have monitored the performance of assets via our reliability centered maintenance processes outlined above and have not seen a detrimental effect to the performance of the regulator assets, or increasing loss of supply incidents, at I&C sites.

Corrective maintenance

Faults are generally reported by the consumer in the form of 'no gas' or 'gas leakage' reports, or by the public. Faults are rectified as a priority over scheduled works.

Defects are reported and rectified as follows:

- reported by the consumer or via the emergency telephone number posted at the site;
- reported during audits/inspections. MGN rectifies defects either during the next scheduled maintenance or by a special visit, if warranted; and
- rectified by the MGN maintenance crew who are expected to attend to any defects as far as practicable, during scheduled maintenance activities.

4.4.3. Monitor and review

Monitoring of assets includes the following:

- capacity to meet customer demands for gas, delivered at required flow rates and pressures;
- highlighting existing and emerging issues related to normal ageing over time, accelerated aging or new risk issues;
- continuous collection of operational data, trend monitoring for emerging issues and amendment to operational procedures or capital program recommendations post risk analysis;
- auditing to ensure activities and processes comply with required industry standards. The results of both internal and external auditing are reported to management;
- performance measures – large consumer regulator performance is measured during regulator performance trials prior to acceptance and use by MGN. Individual regulator site performance such as pressure, flow and response are measured and recorded during scheduled and corrective maintenance works. These measures are analysed on a regular basis to ensure the correct strategies are being applied.

Our reviewing activities include:

- review of real time data;
- review of field reports and assessments;

- review of asset performance, condition and integrity KPIs. These are reviewed on a monthly basis in the monthly operating and management report and annually through, amongst others, the Distribution System Performance Review.
- review of quarterly and annual regulatory reports

Key internal audits include:

- supervisor monitoring audit;
- verification audits - The purpose of these audits is to verify that audits of task related activities provide credible and consistent results;
- technical facility audits - Findings from these audits are reported to management through detailed reports; and
- MGN audits - as required to provide confidence that contractors are operating with due diligence and in compliance with requirements. The results of these audits are communicated to the AGIG management team.

Key external audits include:

- regulatory audits – conducted by regulators as a means of ensuring that activities performed conform to legislative requirements. Audit results form an important input to management improvement processes; and
- Safety Management Plan audits – external auditors may be engaged to conduct audits on particular aspects of safety or operating plans.

4.4.4. Repair, replace, abandon

From time to time, there is a requirement to repair, replace or abandon an asset. Any significant programs that are not considered as part of routine repair or maintenance are captured in this Large Consumer Regulator Strategy.

Replacement of large consumer regulators and associated components is usually undertaken as a capital project. To promote efficient delivery of the work, regulator replacement is aligned with scheduled maintenance activities, where practicable.

Large consumer regulator components vary widely with regards to age, type, function and utilisation. Refurbishment is therefore determined on a case-by-case basis. The primary drivers for replacement of large consumer regulators and associated components are if the following cannot be rectified with tuning or spare parts on site:

- failing to maintain lock-up and/or set pressure;
- gas leakage – internal and/or external;
- reduced operational capabilities;
- improving maintenance efficiencies;
- aligning to industry good practice; and
- availability of spare parts.

Replacement of large consumer regulators and associated components is primarily driven by:

- **availability of serviceable spare parts**. As critical equipment replacement parts become unavailable, equipment can no longer be maintained to satisfactory levels. Equipment must be replaced with suitable commercially supported units to mitigate the

risk of longer loss of supply incidents. Replacement will be based on the forecast availability of spares and the current level of regulator family exposure;

- **ability to meet capacity requirements.** Consumer and network driven gas load/pressure changes and customer consumption profiles can cause components to exceed original design ratings or capacities, and hence necessitate replacement; and
- **ability to meet operational, safety and regulatory requirements.** Many sites were constructed/installed at the formation of the (former) Gas and Fuel Corporation. Some of these sites no longer meet current industry standards or MGN standards and require re-work/replacement in order to meet current operational requirements and industry good practice. These sites are rectified as required and include such safety improvements as OPSO protection so that customers are protected from high pressures throughout their installations, which can cause damage to equipment and/or result in significant gas leaks.

4.5. Network adaptation – renewable gas

In line with MGN's objective to support energy sector decarbonisation, our asset management practices consider the introduction of hydrogen into MGN's network. Where practicable, when replacing gas distribution network equipment and components, we purchase parts that are compatible with hydrogen and renewable gas, taking a prudent and incremental approach to making the network 'hydrogen ready'.

This incremental approach allows us to facilitate the energy policy direction to decarbonise Australia's energy sector, and to do so in an efficient manner. Gas transmission and distribution pipelines are among Australia's most important energy transportation systems. It is vital these high value assets keep pace with the energy transition happening right across the country, and we ensure the gas networks are ready to transport renewable gas.

5. Capital program – 2023/24 to 2027/28

5.1. Program overview

The key program that must be delivered during the next AA period is obsolete large consumer regulator replacement program. This work is necessary to ensure we continue to comply with our obligations under the Gas Safety Case, the Victorian Gas Distribution System Code and AS/NZS 4645.

MGN has been replacing obsolete regulator models and configurations (listed in Appendix B.2) since 2012. We currently have ~5,000 regulators installed across ~3,500 sites. We have identified installations that have, or will have, unsupported equipment or non-compliant factors that require replacement and/or upgrade. Where regulators have fallen out of manufacturer support, parts and technical service will no longer be available for these regulators, placing the customers at risk of extended outages and disruption to gas supply if the regulators fail.

We intend to replace [redacted] of these obsolete/non-compliant regulators during the next access arrangement period, with the balance ([redacted]) being replaced during the following AA period. By retaining spare parts from the regulators we replace over the next five years, we can mitigate the risk associated with the outstanding ([redacted]) obsolete regulators and defer their replacement. This approach allows us to avoid the additional costs of ramping up resources, while managing the risk to ALARP in the interim.

Where possible, we conduct regulator replacement works at the same time as the regulator would have been due for a full maintenance overhaul (known as a 'full strip down'). This allows us to install the new parts and carry out associated maintenance works in once visit, while simultaneously building up a stock of spares for the remaining population of obsolete regulators. This promotes a more sustainable and cost-effective works program. The order of replacement is prioritised by risk, with focus on those regulators that have shown performance issues and/or gas leaks

Table 5-1 shows the planned profile of replacements across the period. However, the availability of their spare parts, as well as age related accelerated corrosion, will influence the timing of replacements. Certain models may need to be either replaced ahead of schedule or deferred to the later years depending on the availability of spare kits or ongoing condition assessments.

Table 5-1 Capex forecast - Obsolete regulator replacement program, $'000 real 2021

Regulator model		2023/24	2024/25	2025/26	2026/27	2027/28	Totals
Dival 100-LBP	Units						
	Expenditure						
Dival 100-LMP	Units						
	Expenditure						
Dival 100-LTR	Units						
	Expenditure						
Dival 160-LBP	Units						
	Expenditure						
Dival 160-LTR	Units						
	Expenditure						
Dival 250-LBP	Units						
	Exp						
Dival 250-LTR	Units						
	Expenditure						
Donkin 226	Units						
	Expenditure						
Fisher 99-41	Units						
	Expenditure						
Fisher 99-41-0	Units						
	Expenditure						
Grove 11360	Units						
	Expenditure						
Reliance 1813B	Units						
	Expenditure						
Reliance 2002	Units						
	Expenditure						
Reliance 2002M	Units						
	Expenditure						
Reliance 3000	Units						
	Expenditure						
Reliance 3010	Units						
	Expenditure						
Rockwell 243RPA	Units						
	Expenditure						
Rockwell 243RPC	Units						
	Expenditure						
Total Units							
Direct expenditure ($'000)		**548**	**559**	**572**	**495**	**570**	**2,744**

The costs of replacing a large consumer regulator can vary depending on the size, location and type of regulator. Analysis of the [redacted] obsolete regulators due for replacement over the next five years indicates there will more larger regulator replacements/complex projects undertaken than in prior periods.

The cost estimates for the obsolete regulator replacement program over the next AA period are informed by the average four-year historical cost of the replacement regulators from similar-sized regulator replacement projects and reflect ten years of experience delivering similar works. Unit rates are adjusted to reflect the higher cost of materials (steel, copper) and labour experienced in the current market.

5.2. Customer and stakeholder engagement

MGN is committed to operating the network in a manner that is consistent with the long-term interests of our customers. To facilitate this, we conduct regular stakeholder engagement to understand and respond to the priorities of our customers and stakeholders. Feedback from stakeholders is built into our asset management considerations and is an important input when developing and reviewing our expenditure programs.

Our customers have told us their top three priorities are price/affordability, reliability of supply, and maintaining public safety. The asset management activities outlined in this strategy are primarily associated with maintaining reliability of supply at the lowest practicable cost.

Our I&C customers use large quantities of gas, many of whom rely on a continuous gas supply to be able to conduct their business. As such, any disruption to supply can have significant financial consequences for our customers. With this in mind, our obsolete regulator replacement program is designed to minimise the risk of disruption to customer supply by ensuring regulators are supported and/or have a reliable supply of spare parts to allow us to address any supply issues quickly.

5.3. Estimating efficient costs

Estimates are developed using the P50 approach introduced through MGN's Operation, Maintenance and Services Agreement (OMSA) with its preferred maintenance service providers. These costs are inclusive of end-to-end delivery of each 12-month project (currently calendar year – moving to financial year to align with the access arrangement). This includes all field works, MGN approved sub-contractors, any materials and other procurement costs and SAP (asset data) updates.

Unit rates have been established over the past 10 years and are robust and reliable in forecasting expenditure. The mix (type, size and complexity) of regulators being replaced over the next five years is different to those replaced over the last AA period, with a higher number of large/complex replacements forecast.

The forecast cost breakdown is shown in the table below.

Table 5-2: Cost estimate – Obsolete regulator replacement, $'000 real 2021

	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Labour ($)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Materials ($)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	**548**	**559**	**572**	**495**	**570**	**2,744**

Tables may not sum due to rounding.

All expenditure related to this project is capex. This cost is based on historical project costs using SAP upload data where:

- labour includes SP Labour Costs (GL 71000) and weighted portion of service provider overheads (GL 71030 & 71055)

- materials includes all other GL line items with the remaining weighted portion of service provider overheads.

5.3.1. Recommended option

We considered alternative options to address the risk associated with obsolete regulators, including moving to reactive replacement only, and ramping up replacement rates to address all 485 obsolete regulators during the period. These alternative options are discussed in Appendix A.

However, we consider the recommended option of proactively replacing [redacted] large consumer regulators during the period is the most prudent and efficient course of action because:

- it reduces risks to an acceptable level;
- it delivers a balanced portfolio of work for a proven delivery rate;
- it allows for the prudent deferral of some regulator replacements to the next regulatory period by using spare parts;
- it is the most cost-effective option of reducing the risk of equipment failure to as low as reasonably practicable;
- it is deliverable;
- it is consistent with our vision of being a good employer; and
- it will support lower overall costs of delivering services which is sustainably cost efficient and in the long-term interests of customers.

Appendix A Obsolete regulator replacement – Options analysis

A.1 Options considered

The following options have been considered to address the risk associated with the loss of supply to high risk customers due to obsolete regulator failure:

- Option 1 – Proactive replacement of [redacted] obsolete regulators;
- Option 2 – Reactively replace the obsolete regulators upon failure; or
- Option 3 – Proactive replacement of [redacted] obsolete regulators;

Each of these options are discussed in the following sections.

A.1.1 Option 1 - Proactive replacement of [redacted] obsolete regulators

This option involves replacing [redacted] of the [redacted] identified obsolete large consumer regulators within the next AA period, with the remaining [redacted] units being pushed into the following AA period. The life of these remaining [redacted] units has been extended by using the spares we collect from the units being removed, with this efficient deferral minimising the price impact to customers.

Cost assessment

The capital cost of this option is $3.6 million. The table below provides a breakdown of the regulator families to be replaced in the next AA period. This has been further profiled in Table 5-1. However, the availability of their spare parts, as well as age related accelerated corrosion, will influence the timing of replacements. Certain models may need to be either replaced ahead of schedule or deferred to the later years depending on the availability of spare kits or ongoing condition assessments.

Table Appendix 1: Option 1 capex forecast - Obsolete regulator replacement program, $'000 real 2021

Regulator family	No. of units	Expenditure ($'000)
Dival 100-LBP	[redacted]	[redacted]
Dival 100-LMP	[redacted]	[redacted]
Dival 100-LTR	[redacted]	[redacted]
Dival 160-LBP	[redacted]	[redacted]
Dival 160-LTR	[redacted]	[redacted]
Dival 250-LBP	[redacted]	[redacted]
Dival 250-LTR	[redacted]	[redacted]
Donkin 226	[redacted]	[redacted]
Fisher 99-41	[redacted]	[redacted]
Fisher 99-41-0	[redacted]	[redacted]

Regulator family	No. of units	Expenditure ($'000)
Grove 11360	[redacted]	[redacted]
Reliance 1813B	[redacted]	[redacted]
Reliance 2002	[redacted]	[redacted]
Reliance 2002M	[redacted]	[redacted]
Reliance 3000	[redacted]	[redacted]
Reliance 3010	[redacted]	[redacted]
Rockwell 243RPA	[redacted]	[redacted]
Rockwell 243RPC	[redacted]	[redacted]
Direct expenditure ($'000)	[redacted]	**2,744**

Risk assessment

The key risk event being addressed by the obsolete regulator replacement program is that a large consumer regulator will fail, causing a loss or overpressure of the customer's supply. Not having available spare parts or suitable replacements units would significantly extend the length of time without supply.

An extended supply loss to sensitive customers such as hospitals, nursing homes, and industrial sites presents a credible risk scenario. The untreated risk (i.e., with no controls to expedite repairs in place) is considered a high supply risk, coupled with a related intermediate environmental and compliance risk.

The untreated risk[2] rating associated with obsolete regulators is presented in the table below.

Table Appendix 2: Risk assessment – untreated risk – obsolete regulators

Untreated risk	People	Supply	Environment	Reputation	Financial	Compliance	Overall risk
Frequency	Frequent	Frequent	Frequent	Frequent	Frequent	Frequent	High
Severity	Trivial	Severe	Minor	Trivial	Trivial	Minor	
Risk Level	Low	High	Intermediate	Low	Low	Intermediate	

Option 1 reduces the likelihood of a prolonged return to service to remote, which reduces the overall supply risk assessment to low. This option is consistent with the requirements of our risk management framework, as it allows MGN to systematically address risks associated with obsolete regulators in a descending risk profile.

Table Appendix 3: Risk assessment – Option 1 – obsolete regulators

Option 1	People	Supply	Environment	Reputation	Financial	Compliance	Overall risk
Frequency	Remote	Remote	Remote	Remote	Remote	Remote	Low
Severity	Trivial	Severe	Minor	Trivial	Trivial	Minor	
Risk Level	Negligible	Low	Negligible	Negligible	Negligible	Negligible	

[2] Untreated risk is the risk level assuming there are no risk controls currently in place. Also known as the 'absolute risk'.

Alignment with vision objectives

The following table shows how Option 1 aligns with our vision objectives.

Table Appendix 4: Alignment with vision – Option 1

Vision objective	Alignment
Delivering for Customers – Public Safety	Y
Delivering for Customers – Reliability	Y
Delivering for Customers – Customer Service	Y
A Good Employer – Health and Safety	Y
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	-
Sustainably Cost Efficient – Working within Industry Benchmarks	Y
Sustainably Cost Efficient – Delivering Profitable Growth	-
Sustainably Cost Efficient – Environmentally and Socially Responsible	Y

Option 1 would align with our objectives of *Delivering for Customers*, as it would address the risk of these regulators failing as well as maintaining a reliable supply of natural gas for customers on the network.

The replacement of these regulators would also improve the health and safety of field personnel working at these sites and therefore would be consistent with being *A Good Employer*.

The program is a common program across the industry and thus works within industry benchmarks and aligns with the MGN vision of being *Sustainably Cost Efficient*. It also manages the risk of poor pressure control which allows MGN to be environmentally and socially responsible.

A.1.2 Option 2 – Reactively replace the obsolete regulators upon failure

This option entails continuing to operate obsolete large consumer regulator models on the network rather than replacing them. Selection of this option will mean that spare parts replacement will not exist during scheduled overhaul maintenance or breakdown maintenance.

Cost assessment

This option has no up-front capital cost. Without available spare parts, operating maintenance costs will likely reduce in the short-term as regulators will not be able to be maintained adequately. However, replacing the units on reactively on failure will likely cost significantly more than if done so proactively due to additional procurement, materials and reactive (likely outside of normal working hours) labour costs.

Risk assessment

This option results in operating the network with a higher level of risk as there is significant potential for the regulator to fail in the field. Failure may result in poor pressure control and possible supply outages during peak periods or the station supplying peak pressures, while reactive replacement is completed. This leads to the potential for industrial and commercial customers supply to be cut off, causing customer outrage.

Option 2 does not reduce the risk to low or ALARP and is therefore inconsistent with the requirements of our risk management framework.

Table Appendix 5: Risk assessment – Option 2 – obsolete regulators

Option 2	People	Supply	Environment	Reputation	Financial	Compliance	Overall risk
Frequency	Occasional	Occasional	Occasional	Occasional	Occasional	Occasional	Intermediate
Severity	Trivial	Severe	Minor	Trivial	Trivial	Minor	
Risk Level	Low	Intermediate	Low	Low	Low	Low	

Alignment with vision objectives

The following table shows how Option 2 aligns with our vision objectives.

Table Appendix 6: Alignment with vision – Option 2

Vision objective	Alignment
Delivering for Customers – Public Safety	N
Delivering for Customers – Reliability	N
Delivering for Customers – Customer Service	N
A Good Employer – Health and Safety	N
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	-
Sustainably Cost Efficient – Working within Industry Benchmarks	-
Sustainably Cost Efficient – Delivering Profitable Growth	-
Sustainably Cost Efficient – Environmentally and Socially Responsible	N

Utilising the regulators until failure would not align with our objectives of *Delivering for Customers*, as it would/would not address the risk of these regulators failing thus not maintaining a reliable supply of natural gas for customers on the network.

In addition, this option would not improve the health and safety of field personnel working at these sites and therefore would not be consistent with being *A Good Employer*.

This option is not within industry benchmarks and does not align with the MGN vision of being *Sustainably Cost Efficient*. It also does not manage the risk of poor pressure control which does not allow MGN to be environmentally and socially responsible.

A.1.3 Option 3 – Proactive replacement of [redacted] obsolete regulators

This option involves ramping up resources and replacing all [redacted] identified obsolete large consumer regulators within the next AA period. This would eliminate the risk associated with obsolete regulators during the period and would negate the need to retain soft spares.

Cost assessment

The capital cost of this option is $5.2 million. This estimate utilises the same unit rates as Option 1 but applies it to the entire forecast obsolete regulator fleet still operating on the network. However, it should be noted that the additional work will require significant ramping up of

resources, which may result in a premium on labour costs if resourcing becomes constrained during the period. This would significantly increase the overall program costs. We therefore consider the $5.2 million estimate presented in the table below to be conservative.

Table Appendix 7: Option 3 capex forecast - Obsolete regulator replacement program, $'000 real 2021

Regulator Family	Number of units	Expenditure ($'000)
Dival 100	[redacted]	[redacted]
Dival 100-LBP	[redacted]	[redacted]
Dival 100-LMP	[redacted]	[redacted]
Dival 100-LTR	[redacted]	[redacted]
Dival 160-LBP	[redacted]	[redacted]
Dival 160-LTR	[redacted]	[redacted]
Dival 250-LBP	[redacted]	[redacted]
Dival 250-LTR	[redacted]	[redacted]
Donkin 226	[redacted]	[redacted]
Fisher 99-41	[redacted]	[redacted]
Fisher 99-41-0	[redacted]	[redacted]
Grove 11360	[redacted]	[redacted]
Reliance 1813B	[redacted]	[redacted]
Reliance 2002	[redacted]	[redacted]
Reliance 2002M	[redacted]	[redacted]
Reliance 3000	[redacted]	[redacted]
Reliance 3010	[redacted]	[redacted]
Rockwell 243RPA	[redacted]	[redacted]
Rockwell 243RPC	[redacted]	[redacted]
Total	[redacted]	[redacted]

Risk assessment

Option 3 reduces the likelihood of a prolonged return to service to remote, as it eliminates the possibility that the regulators are unsupported (and irreparable). This in turn reduces the supply risk to low.

While Option 3 mitigates the risk, it does so at a significantly higher cost than Option 1. As discussed above, Option 3 is also subject to a deliverability risk, which may inflate costs further. We would therefore not recommend Option 3 ahead of Option 1, as we do not consider the additional risk reduction is commensurate with the higher cost of the solution.

Table Appendix 8: Risk assessment – Option 3 – obsolete regulators

Option 3	People	Supply	Environment	Reputation	Financial	Compliance	Overall risk
Frequency	Remote	Remote	Remote	Remote	Remote	Remote	Low
Severity	Trivial	Severe	Minor	Trivial	Trivial	Minor	
Risk Level	Negligible	Low	Negligible	Negligible	Negligible	Negligible	

Alignment with vision objectives

The following table shows how Option 3 aligns with our vision objectives.

Alignment with vision – Option 3

Vision objective	Alignment
Delivering for Customers – Public Safety	Y
Delivering for Customers – Reliability	Y
Delivering for Customers – Customer Service	Y
A Good Employer – Health and Safety	Y
A Good Employer – Employee Engagement	-
A Good Employer – Skills Development	-
Sustainably Cost Efficient – Working within Industry Benchmarks	N
Sustainably Cost Efficient – Delivering Profitable Growth	-
Sustainably Cost Efficient – Environmentally and Socially Responsible	Y

Replacing all obsolete regulators within the period would align with our objectives of *Delivering for Customers*, as it would address the risk of these regulators failing as well as maintaining a reliable supply of natural gas for customers on the network.

It would not be in line with working within industry benchmarks due to replacing regulators where parts are still available, and where the availability of spares can be utilised to prudently defer some replacements to a later date, without a significant impact on risk. The forecast rate of replacement is already an established cost effective and sustainable delivery volume. This option therefore does not align with our objective to be *Sustainably Cost Efficient*.

Appendix B List of large consumer regulators

B.1 Active sites installed by year

Data as of 20/10/2021

Year	No. of Units	Year	No. of Units
1969	3	1996	98
1970	3	1997	80
1971	4	1998	85
1972	6	1999	100
1973	10	2000	106
1974	24	2001	116
1975	11	2002	123
1976	21	2003	140
1977	24	2004	113
1978	24	2005	99
1979	40	2006	95
1980	47	2007	72
1981	34	2008	90
1982	32	2009	100
1983	20	2010	75
1984	31	2011	43
1985	26	2012	67
1986	35	2013	56
1987	59	2014	57
1988	52	2015	86
1989	45	2016	83
1990	75	2017	79
1991	24	2018	85
1992	31	2019	72
1993	25	2020	69
1994	36	2021	41
1995	73	**Total:**	**3045**

B.2 Regulator types – model by quantity

Data as of 20/10/2021

Regulator Model	A Leg Primary Model	A Leg Secondary Model	B Leg Primary Model	B Leg Secondary Model	Total Installed:
Dival 100	0	2	0	0	2
Dival 100-LBP	0	4	0	1	5
Dival 100-LMP	0	1	0	0	1
Dival 100-LTR	1	67	0	6	74
Dival 160-LBP	0	2	0	3	5
Dival 160-LTR	0	15	0	7	22
Dival 250-LBP	0	23	0	22	45
Dival 250-LTR	0	52	0	22	74
Dival 500	0	45	0	7	52
Dival 512 LTR	0	32	0	0	32
Dival 600 LBP	4	31	3	20	58
Dival 600 LTR	40	109	33	74	256
Donkin 226	0	36	0	3	39
Donkin 226 MK3	0	1	0	1	2
Donkin 999	0	1	0	0	1
Fisher 298 TEG40	0	0	1	1	2
Fisher 298 TEG50	9	10	10	11	40
Fisher 298 TEK40	0	0	1	1	2
Fisher 298 TET40	9	9	8	8	34
Fisher 298 TK	2	2	4	4	12
Fisher 298 TK40	7	7	7	7	28
Fisher 630	1	1	1	1	4
Fisher 99-41	3	16	3	16	38
Fisher 99-41-0	13	0	13	0	26
Grove 11135	1	1	1	1	4
Grove 11308	0	0	0	0	0
Grove 11351	1	1	1	1	4
Grove 11360	1	1	1	1	4
Norval 375	25	25	21	21	92
Norval 375 TR	0	1	1	1	3
Norval 495	2	3	3	3	11
Norval 630	0	2	0	2	4
Reflux 851	1	1	0	0	2
Reliance 1803	0	1	1	0	2
Reliance 1813B	0	28	0	19	47
Reliance 1843	8	1733	4	590	2335
Reliance 1843B	0	345	1	22	368

Regulator Model	A Leg Primary Model	A Leg Secondary Model	B Leg Primary Model	B Leg Secondary Model	Total Installed:
Reliance 1843C	0	7	0	0	7
Reliance 1883	0	79	0	75	154
Reliance 1883B	0	16	0	12	28
Reliance 2002	1	39	1	31	72
Reliance 2002M	51	17	40	14	122
Reliance 3000	1	20	1	18	40
Reliance 3010	19	0	17	0	36
Reliance Axial Flow H5	22	22	20	19	83
Reliance Axial Flow H7	1	0	0	0	1
Reval 182	1	2	0	2	5
Rockwell 243RPA	0	5	0	5	10
Rockwell 243RPC	7	1	7	1	16

Glossary and definitions

The table below is a comprehensive list of asset management terminology and acronyms commonly used at AGIG. Note not all these terms may appear in this document.

Term	Meaning
AA	Access arrangement
ACIF	Australian Construction Industry Forum
AEMO	Australian Energy Market Operator: Responsible for the administration and operation of the wholesale national electricity market in accordance with the National Electricity Code.
AER	Australian Energy Regulator: Responsible for the economic regulation of energy networks.
AGIG	Australian Gas Infrastructure Group
AGN	Australian Gas Networks
AHC	Australian Hydrogen Centre
ALARP	As low as reasonably practicable
AMP	Asset Management Plan
AMS	Asset Management Strategy
ARS	Ancillary Reference Service - Standard services offered by Multinet Gas at fixed charges
AS/NZ	Australian/New Zealand Standards
AUS EX	Australian Program for the Certification of Equipment for Explosive Atmospheres
Available testing	Testing of a non-faulty meter returned from the field less than 10 years old from purchase or repair tested in a meter testing facility before being re-installed in the field to complete its in-service life.
Capex	Capital expenditure
Cathodic protection	Prevention of corrosion by application of direct electric current to the surface of a metal.
Cathodic protection unit (CPU)	A device providing cathodic protection current, powered from an external energy source. Such energy sources include mains power, solar, etc. Cathodic protection units require permits and registration in accord with the Electricity Safety (Cathodic Protection) Regulations 2009
Cathodically protected (Distribution) area	An electrically isolated area within the distribution system, of size convenient and practicable for assessing and maintaining the effectiveness of corrosion protection

Term	Meaning
CI	Cast iron
Coating quality survey	A survey conducted by traversing directly above a coated main along its length using equipment and techniques designed to identify any defects in the coating. Methods in common use include "Pearson" and Direct Current Voltage Gradient (DCVG)
Coil (Electromagnetic coil) Survey	An electromagnetic tracing technique for locating points of failed insulation or electrical contact to other metallic structures.
Corrosion	The deterioration of metal caused by its electrochemical reaction with its environment
CP	Cathodic Protection
CPU	Cathodic Protection Units
CTM	Custody Transfer Meter. A large capacity meter installed at every injection point from the DTS to MGN's network.
Current AA period	Jan 2018 to June 2023
Data logger	Interval metering equipment that counts pulses from the mechanical meter index and records gas volume.
Direct Current Voltage Gradient (DCVG) Survey	A type of coating quality assessment survey conducted by traversing above the pipeline using equipment that applies pulsating DC electrical signals to identify coating defects.
Drainage Bond	An electrical connection via cable from a point in the distribution system to tram or train substations to prevent adverse effects from stray currents. These installations include equipment to control the direction and magnitude of current flowing.
DTS	Declared Transmission System
EDMI	Meter manufacture and supplier to MGN
EFT	Economic Feasibility Test
Electrical isolation	The electrical separation of structures to be protected from other structures and/or electrical systems. This is achieved by the installation of insulating flanges, monolithic insulating joints and insulating couplings
ESV	Energy Safe Victoria. A government body responsible for the safety and technical regulation of energy networks in Victoria.
FIRB	Foreign Investment Review Board
FLE	Field Life Extension. Alternative name for Sample Testing Program/in-service compliance testing of diaphragm meters <30m3/hr.

Term	Meaning
Flow corrector	Interval metering equipment which can correct gas flow to energy with the help of live pressure and temperature values.
FY	Financial year
Galvanic (Sacrificial) anode	A block of metal which provides protection by preferentially sacrificing itself instead of allowing the steel to corrode.
Gas meter	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
GDSC	Gas Distribution System Code
GFC	Gas and Fuel Corporation
GFCV	The Gas and Fuel Corporation of Victoria
GIS	Geographic Information System
GJ	Giga Joule, 1 Giga Joule = 1,000,000 Joules
GPC	Group Pressure Control
GPRS	General Packet Radio Services
GSC	Gas Safety Case
GSM	Global System for Mobile Communications
HDPE	High density polyethylene
HP	High pressure (140 to 515 kPa)
HP2	High pressure 2 (600 to 1050 kPa)
I&C	Industrial and Commercial
IEC EX	International Electrotechnical Commission System for certification to Standards Relating to Equipment for Use in Explosive Atmospheres
ILI	In line inspection
Interval meter site	Installation which is large enough (with respect to gas usage) to warrant the use of hourly metering data via a data logger of flow corrector.
IO	Input output
kPa	KiloPascals
L&G	Landis & Gyr – Meter manufacture and supplier to MGN

Term	Meaning
Large meter	Meter with capacity greater than >10 sm^3/hr.
LP	Low pressure (1.4 to 7 kPa)
MAOP	Maximum allowable operating pressure
Meter family	A group of the same meter brand and type installed in the same calendar year.
Meter type	Refers to the technique employed to measure gas flow i.e. Rotary, Turbine, Diaphragm.
MG	Multinet Gas
MGN	Multinet Gas Networks
MHQ	Maximum Hourly Quantity
MIBB	Market Information Bulletin Board
MP	Medium pressure (35 to 210 kPa)
MPE	Maximum Permissible Error
NATA	National Association of Testing Authorities
NCC	Network Control Centre
Next AA period	July 2028 to June 2028
NGL	National Gas Law
NGR	National Gas Rules
NMI	National Measurement Institute
Non-reference Service	Non-standard services offered by MGN provided at fair and reasonable cost.
OEM	Original Equipment Manufacturer
OMSA	Operational and Management Services Agreement between MGN and Service Provider
Opex	Operating expenditure
PE	Polyethylene
PIG	Pipeline Inspection Gauge
PMC	Periodic meter change
PVC	Poly vinyl chloride

Term	Meaning
RAB	Regulated asset base
RF	Radio Frequency
RTU	Remote Telemetry/Terminal Unit
Sample testing program	Annual program whereby sample meters from each meter family population are tested as per AS/NZS 4944 to determine their on-going or extension to their in-service life in the field
SAP	An Enterprise Resource Planning tool which used recording asset data and maintenance management.
SCADA	Supervisory control and data acquisition
SEPP	State Environment Protection Policy
Shared assets	Shared network assets – for example, Mains in the street
SIOS	SCADA Input Output Schematic
sm^3/hr	Standard cubic meters per hour (either Gas or Air).
Small meter	Meter with capacity less than 10 sm^3/hr. Normally used for Residential (domestic) purposes.
SMS	Safety Management Study
Spot potential reading	A measurement of pipe-to-soil potential taken at a given location at a particular point in time. Such readings can be used to assess protection status where potentials do not vary with time. However, in circumstances where potentials fluctuate due to telluric or stray current influences, recordings of potential over a period of time (usually 24 hours) are necessary
Stray current electrolysis	Is the effect of stray currents on buried metallic structures
Tariff D	Tariff D applies to customers using greater than 10,000 GJ a year or more than 10 GJ MHQ.
Tariff L	Tariff L is open to customers who consume more than 1,000 GJ per annum or less than 10,000 GJ per annum and have an MHQ demand of less than 10 GJ per hour.
Tariff V	Applies to customers using less than 10,000 GJ a year and less than 10 GJ MHQ.
Test point	A conveniently located termination point for electrical cables connecting to a buried pipeline. This allows measurement of the pipeline potential, and is the principal method of assessing the effectiveness of corrosion protection. Test points are also required for coating quality surveys and electromagnetic coil surveys to investigate losses in protection
Thyristor drainage unit (TDU)	Electrical equipment, usually installed in tram or train substations, to provide sufficient negative voltage for drainage bonds to be effective. The output voltage of TDUs is normally controlled so as to vary in accord with substation load
TJ	Terajoule

Term	Meaning
TP	Transmission Pressure (Pressure Range: Above 1050 kPa)
UAFG	Unaccounted for gas
UPS	Unprotected steel
Variable conductance drainage bond (VCDB)	Electronic equipment used to control the current in a drainage bond. The output current of VCDBs is normally controlled to maintain a set level of protection on a structure
Victorian Electrolysis Committee (VEC)	The Victorian Electrolysis Committee comprises membership of all parties affected by or causing stray current electrolysis. It is responsible for co-ordination of testing and adjustment required to maintain effective protection from stray currents and to control interference between adjacent cathodic protection systems. It is also responsible for administration of cathodic protection permits and regulations under the authority of Energy Safe Victoria.